

The Mining Journal

Established 1835

Railway & Commercial Gazette

Vol. CCXLII No. 6185

LONDON, MARCH 5, 1954

PRICE 8d

LITTLE-KNOWN FACTS ABOUT TIN: NO. 2

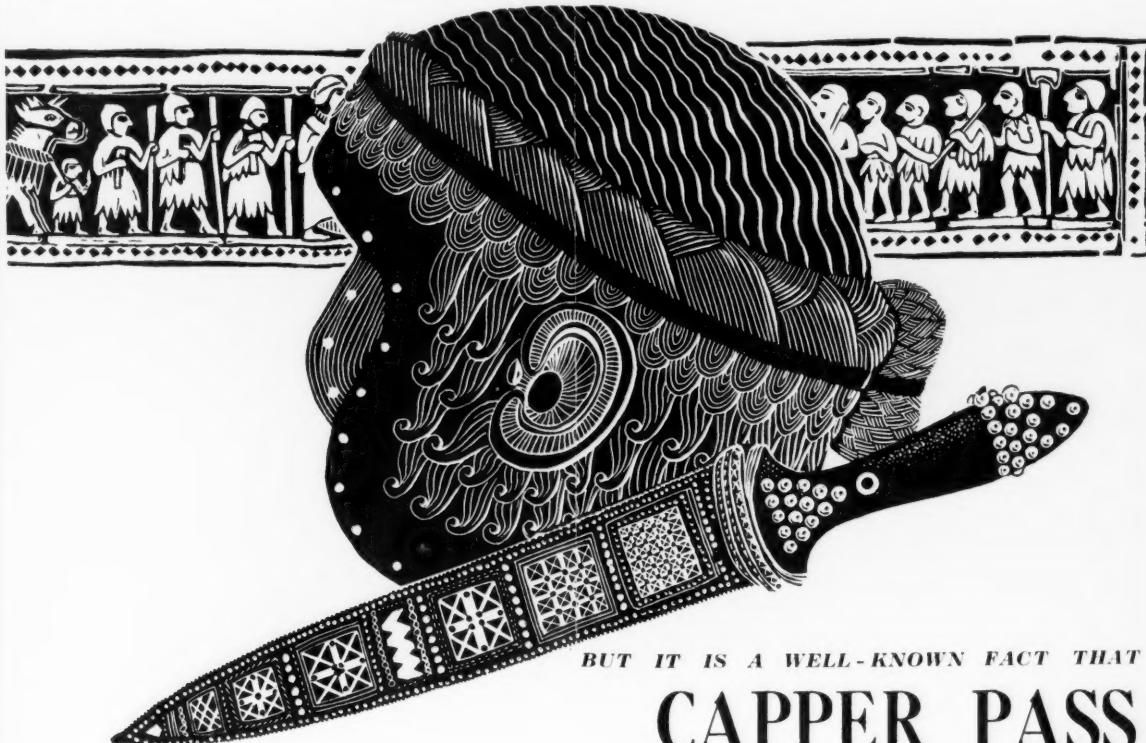
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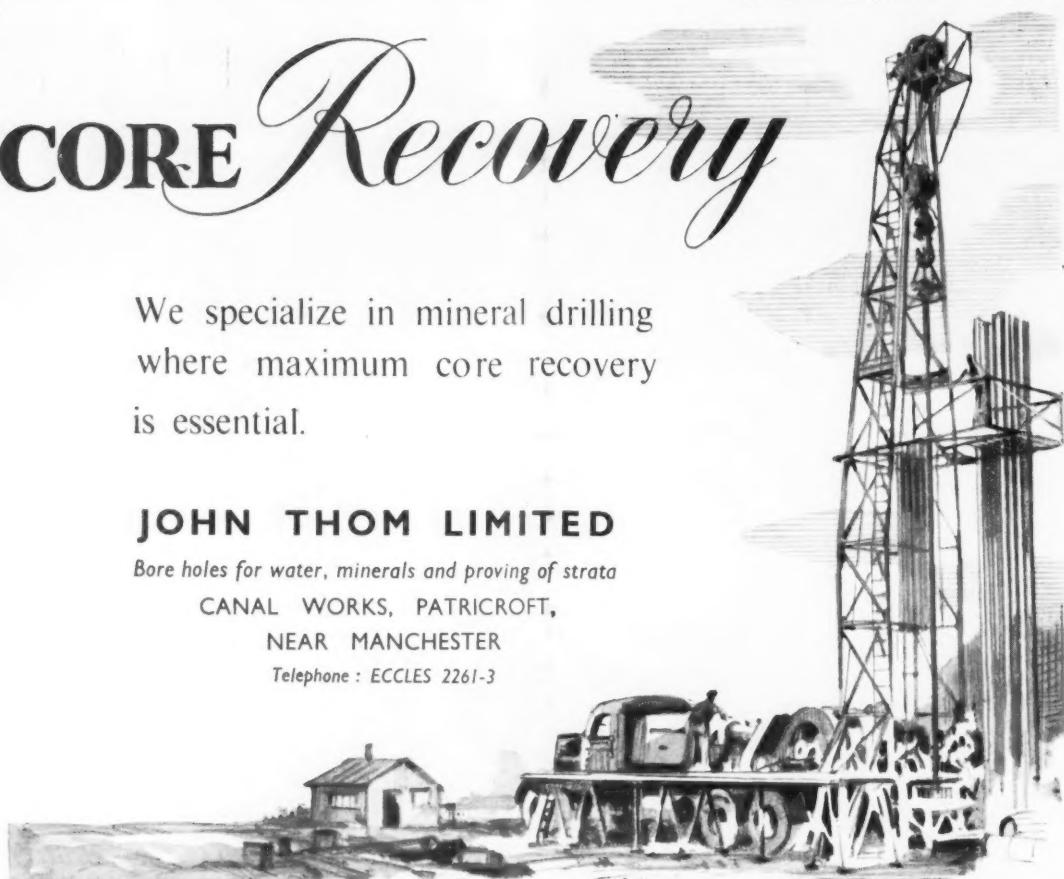
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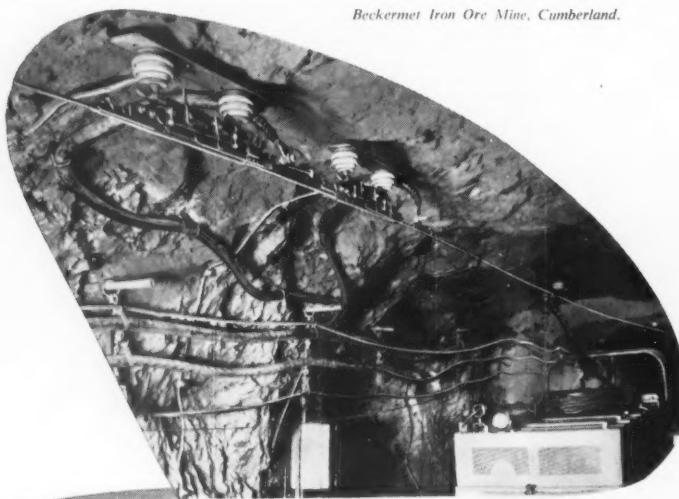
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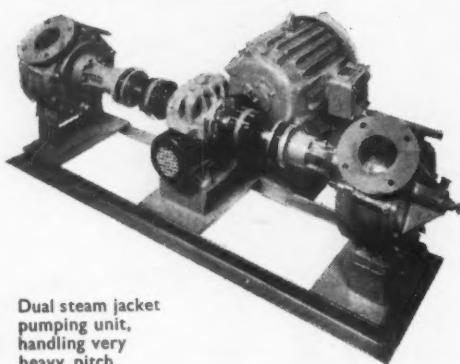
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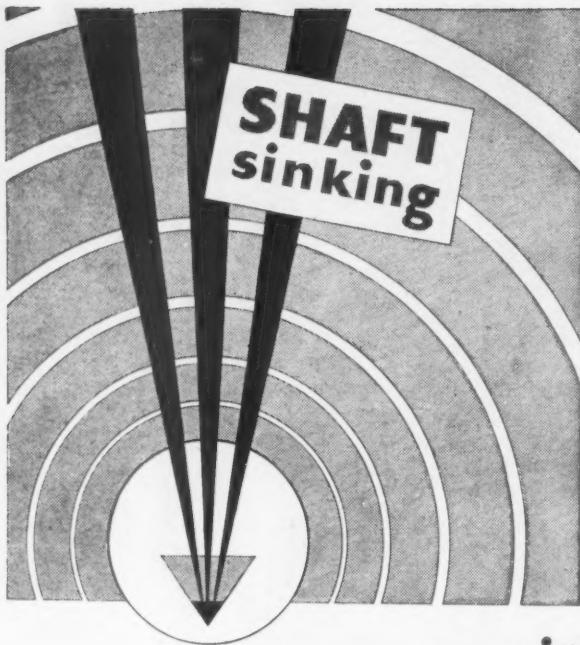
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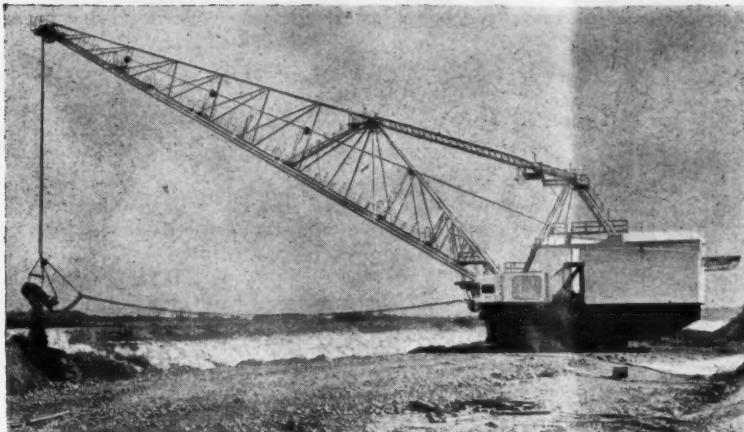
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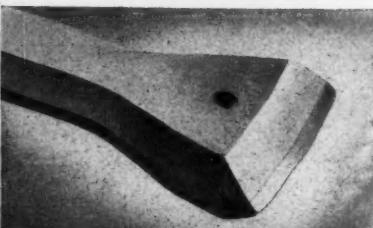


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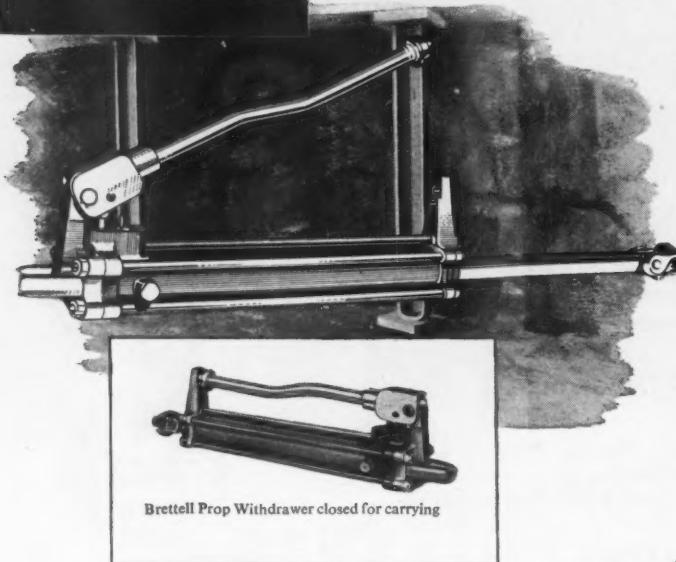
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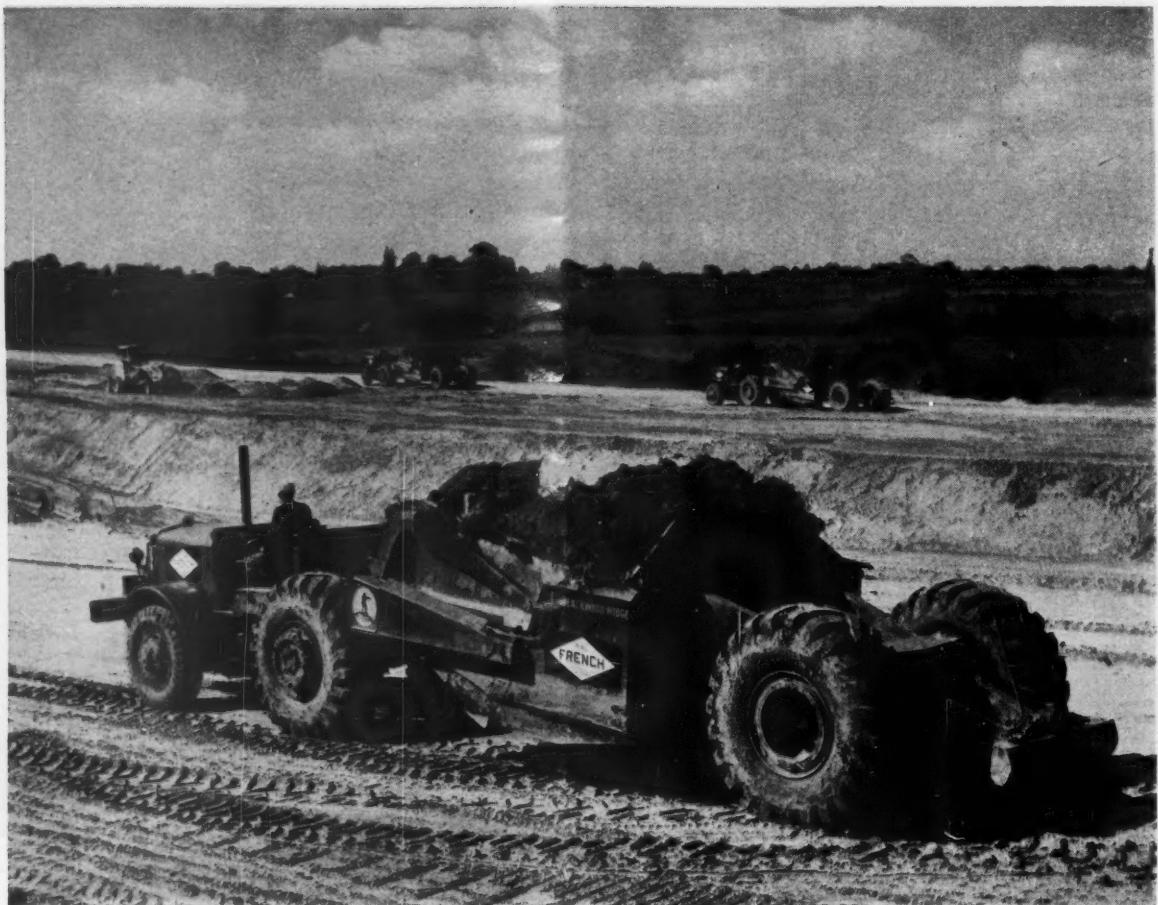
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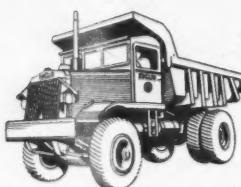
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Published by The Mining Journal Ltd., at 15 Wilson Street, Moorgate, London, E.C.2. MONarch 2567 Subscription £2 per annum

NOTES AND COMMENTS

Indo-China and the Price of Tin

When Viet-minh troops reached Thakhek on December 27 last it was the second time within a year that they had faced the Siamese frontier. Admiral Radford, chairman of the Joint Chiefs of Staff, expressed confidence in Siamese power to resist if attacked, but no attack has yet developed. There has been intense military and political activity nevertheless. The military campaign has changed kaleidoscopically; Viet-minh pressure has been exerted alternately against Thakhek and towards Luang Prabang, capital of Laos, and towards Kontum in central Vietnam, but nowhere to decisive effect.

Meanwhile, the war in Indo-China will be discussed at the forthcoming Geneva conference and Mr. Nehru has called for a cease-fire. A Gilbertian touch has been added to these political developments by the moves on the one hand to create, in association with South Korea, a South-East Asian anti-communist block, and on the other, to form a Buddhist bloc with scarcely veiled Communist sympathies.

There are two ways of effecting a settlement in Indo-China; by amalgamating the rival governments or by dividing the disputed territory. The recent history of Poland and unwillingness of the Vietnam Government to negotiate with Ho Chi-minh should eliminate the first possibility; and the fact that, in large tracts of land, Viet-minh rules by night and Vietnam by day should eliminate the second.

The prospect is undoubtedly gloomy and it is further darkened by the knowledge that the Russians can best prevent France from joining the European Defence Community by keeping the war in Indo-China alive. Yet the markets seem to discount all this at surprisingly little, and whatever danger the war in Indo-China holds for the stability of South-East Asia in general and the well-being of its mining industries in particular, the fact remains that the prices of tin and other metals such as tungsten continue to be settled by simple supply and demand pressures.

No doubt the feeling in London is that the Indo-China situation is unlikely to deteriorate much further, but should, for argument's sake, Viet-minh forces score a decisive vic-

tory the appearance of Communist troops sitting on the Siamese frontier would have a serious impact on Malaya.

Not all would agree with Admiral Radford that Thailand would be able to deter the further advance of the Communist troops, should that be their intention, although at the worst considerations of logistics should ensure a delay of at least a year before any appreciable force could be established on the Malayan frontier. Such a development would, however, undoubtedly mean a reallocation of resources in Malaya and consequently further disruption to the tin industry whether the necessity was one of preparing against any eventuality of direct attack, or merely against the inevitable resurgence of terrorist activity which must be expected to follow any Communist successes further north. Any events resulting in a big, even if temporary, decline in Malayan tin production coupled, as it would be, with the loss of tin supplies from Thailand would most certainly move the price of tin much higher than its present level, burdensome surpluses or no.

On a wider view, however, defeat for the French in Indo-China could conceivably result in another "Korea"—a fact which more than anything else, renders it unlikely that Paris, London and Washington will allow the situation to deteriorate to the point where military aid would have to be rendered on a large scale.

Nuclear Power in the Aluminium Industry

A spokesman for the aluminium industry, which itself is a large consumer of electric power, has predicted that within possibly ten years American industry will be using atomic energy as a supplementary means of furnishing power.

The significance of this estimate for the American aluminium industry lies in the fact that with U.S. hydroelectric resources already fully utilized and vulnerable to drought, further expansion of U.S. aluminium production must be based on high cost power generation until atomic energy becomes a practical source of power. The rapidity with which this development comes about must go a con-

siderable way towards determining the economics of further aluminium expansion programmes in the States as against the alternative of relying on a further expansion of production in Canada where the untapped sources of hydro-electric power are much greater.

According to Mr. T. D. Jolly, vice-president in charge of engineering and purchasing for the Aluminum Company of America, "the time is not too far distant when electricity obtained from facilities based upon atomic energy will take its place as an important supplement to the coal, gas, oil and hydro-based generating facilities upon which we now rely for the power that makes our industry run."

Indeed, Alcoa's ability to use this power in the manufacture of aluminium will not be determined until a number of currently speculative unknowns are reduced to economical facts. Large quantities of electric power are required in the process of smelting aluminium from its refined ore. Aluminium smelting can only be conducted economically where there is enough steady power to make it practical. For this reason, America's largest aluminium producer is interested in all sources of low-cost available power such as atomic energy might prove to be in future years.

Pointing out that several years ago the most optimistic prediction for commercial utilization of atomic energy might be from 20 to 30 years away, Mr. Jolly noted that within recent months leading chemical, public utility and electrical manufacturing company researchers have come to believe that electric power will be generated in plants using atomic energy within ten years. He added that production of aluminium in 1954 would approach 1,500,000 tons. This is an increase of 250,000 tons over 1953 and nearly ten times United States production of primary aluminium in 1939. One estimate has suggested that future demand for primary aluminium might possibly quintuple between 1950 and 1975, both in the United States and in the rest of the world. Accordingly, by 1975 United States' consumption of primary aluminium might be in the neighbourhood of 3,600,000 tons and the rest of the free world 2,400,000.

To meet the continually increasing demand for electricity, not only by the aluminium industry, but by the United States as a whole, Mr. Jolly said that privately owned electric utility companies in that country plan to triple their present investment of \$25,000,000,000 during the next ten years.

The Outlook for Non-ferrous Metals

The consumption of raw materials has very greatly increased during the last 50 years, but not so rapidly as the volume of production of finished goods. This significant conclusion is drawn by Metallgesellschaft Aktiengesellschaft in a survey of the non-ferrous metal industry, which introduces the 41st annual issue of their *Statistical Compilations*, covering the period 1938-52.

A comparison of the expansion of industrial production with the growth of the world's population since the turn of the century shows that the population has increased by about two-thirds, whereas industrial production has multiplied to a much greater extent. The great increase in the consumption of industrial finished products per head was made possible by technical advances of the most varied nature. Since the population of the earth will continue to grow and the productivity of human labour is still capable of rising, a further increase in industrial output may be expected both *in toto* and *per capita*. A necessary consequence of the enormous rise in the production of goods during the last 50 years has been a steady increase in the demand for raw materials.

Favourable geological and technical productive conditions will make possible a greater increase in the future consumption of light metals and plastics. As a consequence of this trend, the increase in raw material consumption by weight will not keep pace with that of the volume of finished products.

The production and consumption of non-ferrous metals show a more than four-fold increase since the turn of the century. Particularly noticeable is the extent to which the part played by light metals in metal consumption as a whole has increased. In the course of the last 50 years heavy metals have had to be extracted from ores of an ever lower grade. In order to produce the same quantity of metal, far larger quantities of heavy metal ores have had to be mined and dressed than in the case of light metals. In spite of improved processes and methods of mining, dressing and smelting, it has not been possible to counterbalance the increased expenditure caused by the larger quantities of ore which have had to be raised and treated per unit of heavy metal. Thus the tendency to use light metals has been further strengthened by the more favourable conditions of their production. It is considered probable that the part played by light metals in satisfying the total demand for metals will be still greater in the future, since the erection of new aluminium and magnesium production plants and the extension of existing ones far exceeds the expansion which is taking place in the production of heavy metals. The increasing part which light metals will play in metal consumption goes hand in hand with a further shift in production and consumption away from Europe.

Despite the competition of new non-metallic materials, metal requirements as a whole are expected to continue growing. Of all the metals known to-day, one-third are of important tonnage production, one-third are just coming into use, and one-third are in practice unused. How fast their production can develop is shown by aluminium, magnesium and titanium. After titanium other new metals like zirconium and hafnium entered into the range of industrial application. For these, plants with an annual output of 75 tons are planned.

Gold Coast Safeguards Investors' Interests

Confirmation, if that was now needed, that the Gold Coast wished to encourage investment of foreign capital in all industries was provided by Dr. Kwame Nkrumah, Prime Minister of the Gold Coast, in an address to the Gold Coast Legislative Assembly at the beginning of this week.

The Gold Coast Government, he declared, did not envisage any limitation on the present freedom to transfer without restriction profits arising from non-resident capital investment, or to repatriate foreign capital invested in the Gold Coast. Moreover, the Government had no plans to nationalize industry beyond the extent to which public utilities were already nationalized. To safeguard against the possibility that later Governments may adopt a different attitude, the Gold Coast Government had requested the U.K. Government to incorporate in the Constitution an appropriate provision to ensure that if, at some subsequent date, the nationalization of a particular industry was considered to be essential, there would be suitable means for guaranteeing fair compensation to the original owners.

To those closely in touch with Gold Coast affairs this statement from the Prime Minister merely confirms the position outlined by other responsible officials in the Gold Coast over the past two years, but this new and more concrete evidence of intent is to be welcomed in a year in which the fate of the Volta River scheme will presumably be decided.

Canada

(From Our Own Correspondent)

Sudbury, February 22.

Labour strikes at the mines of Northern Ontario and Northern Quebec are coming to an end. At all the larger mines the crews have accepted company terms and have returned to work. Wage increases of varying amounts were included in the settlement, but the increases were generally in line with the rates which the companies offered at the beginning, and thus were obtainable without resort to strike action. The plum which the labour unions fought for was the "check-off" of union dues. In no instance was this granted. In fact one mine, the Preston East Dome, which formerly granted the "check-off" before the strike began, is still strikebound, with the company now wishing to discontinue the "check-off" and thus remain in line with conditions prevailing at other mines of the area.

The new 360-mile railway from tidewater on the Gulf of St. Lawrence to the iron fields of Labrador has been completed to a point where a regular train service has been established. Much ballasting remains to be finished, but this will be possible with the line already in operation. The first shipload of iron ore is expected to sail from the tidewater terminal of Seven Islands before the end of summer. This will mark the beginning of production calculated to quickly attain a rate of 10,000,000 tons annually, and with an objective of a possible 20,000,000 tons envisaged in the near future.

Although the indications appear to favour a commencement by late summer in the construction of the St. Lawrence Seaway to permit ocean-going ships to penetrate to the heart of the North American continent, there are factors which promote a cautious attitude. The American opponents of the Seaway (generally regarded as railway interests) have until the end of April to launch an appeal against the licensing of the New York State Power Authority as the United States agent in the St. Lawrence Power Development. There are strong indications that such an appeal may be initiated near the end of April, with the likelihood of thus holding up the development for a further indefinite period. Meanwhile, the iron producers of Labrador are taking no chances on delays of the seaway development, and they are even now calling for tenders in the construction of docks and transfer facilities at Montreal. The plan in view is to begin such construction within the next five weeks, with a view to having such facilities in readiness for the opening of navigation in the spring of 1955.

OPTIMISTIC FUTURE FOR IRON

While attention is centered upon the iron ore developments in Labrador and Quebec, iron mining is also undergoing a rapid increase in the province of Ontario. Students of the iron and steel industry of North America foresee a rise in the aggregate iron ore output of Canada to approximately 30,000,000 tons annually in the next decade. Although there has been considerable unemployment in Canada during late February, there are prospects of a more favourable trend with the end of winter within the next few weeks. Many major new development projects are geared for action and the nation's finances are increasing in stability. Gold reserves alone have reached approximately \$1,000,000,000, in addition to a further amount of more than \$800,000,000 in American funds.

The large amount of capital reaching Canada from Great Britain for participation in basic development is a trend which is causing a large measure of satisfaction in Canada. This, added to the continued large flow of American capital

for industrial development, together with the fact that Canadian financiers themselves are no longer handicapped for lack of financial resources, is all totaling up to promise of continued industrial expansion for some years to come.

THE NICKEL INDUSTRY

International Nickel Co. of Canada has attained a production rate of close to 23,000,000 lb. of nickel per month. This is a value of close to \$14,000,000 monthly from nickel alone. In addition, the company is one of the world's large producers of copper, as well as being the largest platinum producer in the world. After combining International Nickel together with Falconbridge Nickel and the smaller producers, the Sudbury nickel-copper area of Northern Ontario is producing a value of very close to \$1,000,000 during each working day of the year.

In face of the world demand for increased nickel supplies, Rankin Inlet Nickel Mines Co. is developing a property on the far northwest coast of Hudson Bay. The shaft is down 200 ft. To provide finances, Falconbridge Nickel, Conigas Mines, together with private interests, have subscribed \$250,000 with which to provide for accumulated obligations to date, and provision is also being made for a company reorganization intended to provide a further initial \$500,000 for continued development.

ZINC - COPPER - SILVER AT GECO MINES

The major new base metal development of 1954 is Geco Mines in the Manitouwadge area of Northern Ontario, where big widths of zinc-copper-silver ore have been disclosed. Early drilling has already suggested ore in the volume of around 1,000,000 tons per each 100 ft. in depth, thereby indicating a potential mining operation of considerable magnitude. Geco is backed principally by Consolidated Howey Gold Mines, and more than 20 boreholes have been sunk in the area.

Rich percentages claimed at Geco include that of one borehole which revealed copper values of 7 per cent, while another showed 12½ per cent of zinc. While these are rather in excess of the average results obtained from drilling work, other holes have indicated a minimum of from 2 to 3 per cent copper and 3 per cent zinc. When considering these values it is significant that the entire copper mining industry of the United States operates on ore of little more than 1 per cent average copper content, while 3 per cent zinc content is generally regarded as being satisfactory for large scale mining operations.

Although the extent of the Manitouwadge deposits have not as yet been properly assessed, it is already assumed that enough ore is in lie to warrant construction of a mill capable of grinding a maximum of 7,500 tons per day.

The site of the deposit, near the northern shore of Lake Superior and approximately 550 miles almost due north of Chicago, is particularly auspicious as the deposit is thus situated some 30 miles from the route of the projected Trans-Canada natural gas pipeline which it is anticipated will be built within the next few years. Low cost gas would thus be available as fuel for possible smelting and leaching plant.

Transportation and extreme climatic conditions in the area are deterrents to progress, but these factors have not slowed down prospecting operations. Geco Mines and other companies active in the area have so far invested approximately \$200,000 in Manitouwadge. Within three years it is estimated that the total exploration and development investment in the district will have reached approximately \$15,000,000 to \$20,000,000.

Water Infusion in Coal Mining

By A. GRIERSON, B.Sc., A.M.I.Min.E.

Apart from the dangers attendant upon its inflammability, coal dust must in addition be considered as a factor in the development of pneumoconiosis. The use of water sprays at the coal face as a medium of dust suppression is not completely effective, as the smaller and more dangerous coal particles remain suspended in the atmosphere despite the spraying operations. In the following article water infusion is presented as a treatment giving satisfactory results, as by this method the dust forming properties of a dry seam are rendered no greater than those of a naturally damp seam. Of equal importance to, and arising directly from, this work on dust suppression, is the fact that recent experiments have shown water infusion to add to the effectiveness of blasting operations.

The production of coal dust has long been recognized as a major danger in coal mining operations, and as early as 1803 Buddle suggested that mixtures of coal dust and air were capable of promoting explosions. It is only within comparatively recent years, however, that coal dust has been accepted as constituting a danger from a purely physiological aspect. It has become increasingly evident that coal dust must be considered as a factor in the development of the disease now known generally as pneumoconiosis. Thus from considerations of health and because of its inflammability, coal dust is doubly dangerous, and the problem of airborne and deposited dust needs to be vigorously combated.

USE OF WATER INFUSION

Experience has shown that the most effective means of combating dust is to allay it at the source. Water sprays and mist projectors do not effectively deal with the smaller and most dangerous particles, and the use of sprays, whilst giving a certain degree of dust suppression, still leaves much to be desired. A better method of treatment is by infusion of the coal seam which has as its object the impregnation of a dry seam with water or other agent in such a way that its dust forming propensities are no greater than a naturally damp seam.

Water infusion is by no means a recent innovation although its use has increased rapidly within the last decade. In his textbook, *Ventilation in Mines*, published in 1901, Robert Wabner stated : "The Meissner system of wetting the coal face consists in drilling one to three holes to a depth of 40 in. in the coal during the shift preceding that in which the coal is to be worked. A $\frac{1}{2}$ in. iron pipe is then fitted into each hole by the aid of a wooden washer and connected up with the supply pipe, the water pressure then being allowed to act on the coal for eight hours. In this manner the coal is so permeated with moisture that the formation of dust in winning is precluded."

Since this was written numerous applications of water

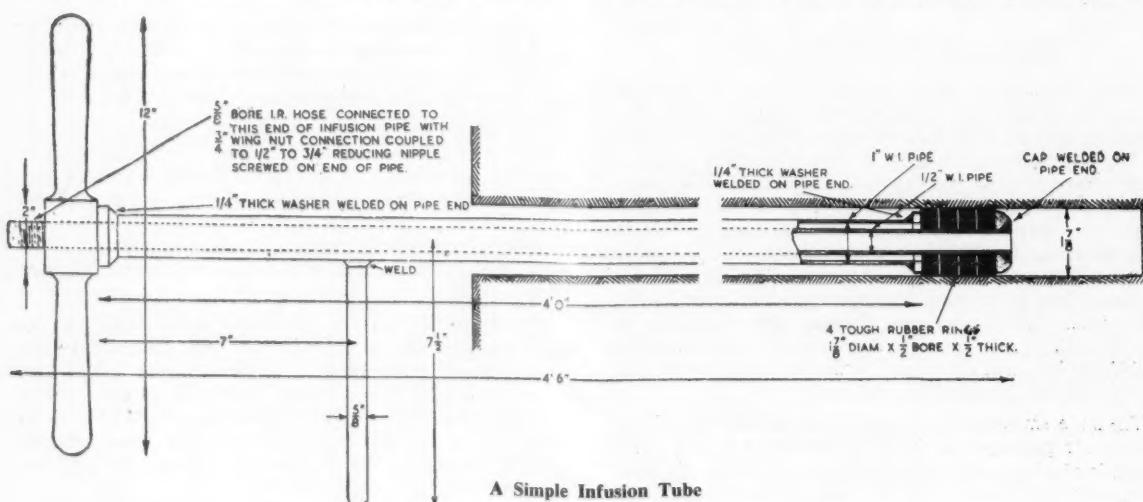
infusion have been made in coalfields throughout the world. The original infusion pipe as described by Wabner has been improved upon, and ancillary equipment developed for use in conjunction with the infusion technique. A simple infusion pipe consists of two concentric wrought iron pipes having respective diameters of $\frac{1}{2}$ in. and 1 in. By operating the screwing handle the inner tube can be retracted, so causing the rubber rings to be compressed between the cap welded on the end of the inner tube and the projection on the end of the outer tube. This forms a watertight seal capable of withstanding appreciable pressure. The infusion water is fed through the inner tube and into the back of the borehole and percolates along the slip joints, so wetting the dust contained along the planes. Thus the slip dust is wetted before extraction of the coal commences, a procedure which may be accomplished by any of the conventional methods.

BENEFICIAL OPERATIONAL METHODS

To obtain the best results from water infusion consideration must be given to certain features :

1. Siting and angle of borehole;
2. Borehole interval;
3. Water pressure and quantity;
4. Length of borehole; and
5. Position of seal in borehole.

The best location of the borehole will depend upon the nature of the seam and adjacent strata and on the presence or otherwise of the dirt bands. Some strata are particularly susceptible to deterioration if subjected to excessive water, and consequently if a dirt band occurs in a seam to be infused, this may be utilized to act as a barrier between the borehole and the sensitive bed. The nature of the seam has, of course, an important bearing on the siting of the borehole. Those seams having a well-defined cleat lend themselves more readily to infusion and where the face line is parallel to the lines of cleavage in the seam, best results are usually obtained with the hole bored at right angles to the



cleavage. This ensures the maximum number of lines of cleavage being cut across per given length of hole.

Where the line of cleavage is oblique to the direction of face advance, angling of the boreholes is sometimes practised. This gives the advantage of cutting across more cleavage planes than if holes were at right angles to the face, but care must be exercised, as if the holes are angled too steeply water may break out at the free face of the coal seam before infusion is complete.

Borehole interval is governed primarily by the nature of the seam and is best determined by practical tests. The distance apart of the holes should be such that the area permeated by one hole just overlaps the treated area from the adjacent hole.

In practice this distance varies widely, ranging between 2 and 20 yards. The greater distances require increased water pressure, but greater borehole interval in general reduces the time involved in treating a face.

WATER PRESSURE

Water pressure should be kept as low as possible as excessively high pressures may burst the seal in the borehole. On occasions the use of too high a pressure has resulted in serious deterioration of roof and floor due to the water penetrating through concealed breaks in the strata. Water pressure must, however, be high enough to overcome the resistance of the slips through which it must flow, and if these slips are not well pronounced considerable pressure is necessary. Pressures varying between 20 p.s.i. and 600 p.s.i. have been used, an average value being in the region of 100 p.s.i.

For the smaller pressures the hydrostatic head is usually sufficient but where very high pressures are required this may be supplemented by pumps. When commencing infusion, a higher pressure is usually necessary to start the flow of water, this pressure being reduced once flow is under way. The question of the quantity of water to be infused merits the closest attention and experience has shown that a water flow-meter is an indispensable part of the infusion equipment.

In the early days of water infusion it was customary to allow uncontrolled flow of water until the hole showed signs of "bleeding," i.e., until water broke out on the free face of the coal near the borehole. There are instances of as much as 3,000 gallons of water being injected into a single hole. Such quantities are far in excess of the amount required to allay the dust and as was to be expected the superfluous water had an adverse effect on the adjoining strata.

DISADVANTAGES OF OVER-INFUSION

As coal is more difficult to clean when wet the disadvantages of over-infusion are seen to be twofold. The current practice is to determine by experiment on the face to be infused the correct quantity of water required to produce satisfactory dust conditions and by means of the flowmeter ensure that this is the quantity that is injected. Average values for the amount of water would appear to be in the region of 1-2 gallons per ton of coal treated. Thus, on a face 150 yards in length, 4 ft. 6 in. high and infused to a depth of 6 ft. with holes at 5 yard intervals, the amount of water per hole would be 15-30 gallons.

It is claimed that the addition of wetting agents, such as mineral oils, to the injected water results in a reduction of the quantity of water required per hole. The beneficial effects of wetting agents are particularly pronounced where infusion is taking place on slowly moving faces. In such conditions the effects of infusion by pure water are soon lost due to evaporation of the water. This evaporation loss

cannot always be made good by reinfusing the holes as it is difficult to seal the holes a second time.

The rate of flow of water into the hole is generally of the order of 2 gallons per min. Knowledge of the tonnage of coal to be treated from each borehole and the amount of water required per ton enables the period of infusion to be determined. This ranges from 15 to 60 min. normally. If time is of primary importance the rate of flow may of course be increased, but too rapid a flow can give rise to incomplete permeation. In many cases multiple infusion has been adopted and on occasions up to six holes have been infused simultaneously. It has been stated that this method does not give good results from the dust suppression standpoint, principally because of the variation of resistance to water flow in adjacent boreholes.

BOREHOLE LENGTH AND SEAL POSITION

This is primarily governed by the rate of advance of the face and there seems to be little advantage to be gained by the use of long advancing boreholes since in general the slips are too tight well ahead of the face to permit of ready infusion unless high pressures are used. The use of extremely long infusion holes to impregnate entire panels of coal has been tried in various countries. With this system long boreholes are drilled from headings forming the flanks of the pillar. The entire pillar is therefore pre-infused before extraction commences so dispensing with the complications of infusion equipment on the actual working face. Holes up to 60 ft. in length drilled parallel to the face and having a burden of 5 ft. 6 in. have been used successfully on faces worked by pneumatic picks.

The position of the seal should be as near the mouth of the borehole as will enable complete permeation to take place without allowing water to escape from the free face of the coal. If the seal is situated too far back in the hole not only will higher pressures be required but in addition the wall of coal between the free face and the seal will not be adequately impregnated. Wherever the seal be placed the value of water infusion is lost unless good roof control obtains. If the strata ahead of the working face is broken by primary and secondary breaks, escape of water is inevitable and not only is dust suppression efficiency lost but stratum deterioration may result.

STEAM INFUSION

Steam has been used on many occasions on the surface as a means of suppressing dust. Being the finest atomized state of water it is a good suppression agent and the condensation of the steam assists in laying the finest particles. Infusion of steam into coal underground has been tried on experimental faces and has met with a measure of success although insufficient data are available to fully assess its usefulness.

The method of steam infusion is similar in most respects to water infusion. The obvious difficulty with the system is the production of steam *in situ*. K. Z. George, in a series of experiments in English collieries, used a portable electrode boiler of 35 kVA. rating giving a working steam pressure of 45 p.s.i.

An interesting feature of these experiments is that George found that steam wetted by secondary water gave better suppression than dry steam, a steam/water ratio of 1 : 3 giving maximum efficiency.

COMBINED WATER INFUSION AND BLASTING

Of recent years experiments have been made to carry water infusion a stage further and not only utilize infused water as a dust suppression agent, but in addition use the water to transmit gaseous pressure produced by explosives and so break down the coal. The effectiveness of water as a means of transmitting pressure impulses is well illustrated

by the firing of depth charges at sea. The combined blasting/water infusion technique utilizes this principle. With this method a charge of explosive is introduced into the borehole and then the infusion tube is inserted. The water pressure is applied for some 15-20 min. and whilst pressure is maintained the explosive is detonated. The gaseous pressure created by the explosive is transmitted through the water mass in the coal and the ensuing heaving action breaks down the coal with a minimum of fragmentation and dust.

This method of dislodging the coal possesses a very important advantage over conventional blasting in that the risk of methane ignition is removed. The water surrounding the explosive charge effectively quenches any flame. Special explosives have been developed for use with the infusion blasting technique, it being necessary to use a water resistant explosive capable of withstanding the high water pressure. Submarine type electric detonators such as used in seismic prospecting are used to fire the explosive.

Broadly speaking there are two applications of the system on longwall faces:

- (a) a series of short holes drilled from the exposed face more or less in the direction of face advance;
- (b) a single long borehole drilled parallel to the face and extending from one gate to the other.

This method of blasting has been successfully applied both in pre-cut and solid coal.

SHORT HOLE BLASTING

With short boreholes the operation is quite simple, a series of holes being drilled to give a burden of some 5-6 ft. followed by infusion and blasting of each hole. If complete bursting down of the coal is required such as when hand-filling is to be done, heavier charges of explosives are used than if the coal is merely to be softened for subsequent removal by some form of power loader. This system of softening coal would appear to lend itself admirably for use in conjunction with coal ploughs in seams otherwise too hard for ploughing.

When blasting in short holes a modification of the simple type of infusion has been found expedient. Due to the possibility of the tube being ejected by the high pressure occasioned by the firing of the explosive, lugs or wedges have been fitted just behind the sealing rings. These are caused to project after the tube has been inserted and so effectively grip the sides of the hole.

LONG HOLE BLASTING

Long hole blasting is, of course, well known in metal mining but is seldom practised in coal mining. In the long hole infusion blasting system a borehole is drilled in the solid coal parallel to the face and some 4 or 5 ft. ahead of it. This hole is drilled from a heading driven ahead of the face and extends from one gate to the other. The hole is then charged with explosive at specified intervals along its length, the separate charges being connected by detonating fuse.

The system has been tried on various face lengths and at an anthracite mine in U.S. a 60 ft. long face has been successfully worked. Indeed, so successful was this system that a considerable increase in the output per man shift has resulted. In the United Kingdom, because of regulations limiting the amount of explosive that can be inserted in a single borehole, special permission had to be obtained in experimental underground installations in order that charges of up to 24 lb. of explosive could be used in a borehole 84 ft. in length. Results from this and similar trials are encouraging and may well lead to much wider use of this application of water infusion.

Atomic Energy in the Free World

Activities in the field of atomic energy are accelerating throughout the free world, and in some instances smaller countries are more progressive than the big powers, according to a survey taken by the American Chemical Society. It is significant that the major powers' billion-dollar budgets do not deter smaller countries, according to Dr. Gunnar Randers, director general of the Norwegian-Dutch reactor at Kjeller, Norway, who believes that most of the large expenditures of the United States have given results now sufficiently well known to save similar outlays of huge sums by others. By concentrating on a project of particular interest, a small country can turn out specific results that compare favourably even with those of the United States, Great Britain and Canada.

The survey shows that non-military atomic energy projects are under way or are being planned in six free-world countries besides the United States, Canada, and England. The newcomers to the field are emphasizing either electric power from atomic energy or radioactive tracers for chemical and medical research. The Norwegian-Dutch Joint Establishment for Nuclear Energy Research (J.E.N.E.R.) has been operating an atomic reactor at Kjeller for almost two years. Dr. Randers says that J.E.N.E.R. plans to build a reactor to develop about 6,000 kilowatts of electricity, possibly for ship propulsion, and is also considering an atomic-fuel power plant of 5,000 to 10,000 kilowatts.

In France, two experimental reactors are already in operation, one at Paris, the other at Saclay. French atomic scientists are working on a 15-year plan to develop nuclear power for industry, which includes a pilot plant in the Rhone Valley to produce plutonium and two more atomic reactors, the first to produce 50,000 kilowatts. A 2,000 kilowatt Belgian atomic power plant at Moli is expected to be completed by 1954. This will be similar to the pile at Oak Ridge, Tennessee.

COMBINED RESOURCES

Meanwhile, the Swiss Atomic Commission is now in the early stages of planning a reactor similar to Canada's N.R.X. plant at Chalk River, Ontario. In addition, a big project in Switzerland will be the European Nuclear Research Centre designed for research into high energy particles and cosmic rays. It will pool the resources of Belgium, the Netherlands, France, Britain, West Germany, Greece, Italy, Sweden, Denmark, Norway, Yugoslavia, and Switzerland. The A.C.S. survey also showed that another international atomic group may soon be formed, the International Nuclear Energy Society. This society would include participants from 19 countries and would aim at the distribution of information, the organization of meetings, and the standardization of atomic nomenclature and symbols.

India's Atomic Energy Commission has received funds from the government to build a reactor and it is anticipated that this will be in operation within three years. India also plans a uranium-thorium factory near Bombay for processing ores, to be ready in fifteen months. There are also plans for atomic power plants in Australia and Brazil. Although Germany desires to begin research, it is still under an Allied ban on atomic energy work.

Natural uranium, which is low in radioactivity, is suitable for non-military uses. Big reactors using natural uranium, moderated with heavy water, can supply power plants and are less costly than the smaller enriched uranium installations. The survey shows that the smaller countries are most interested in heavy-water, natural-uranium reactors.

ASIAN MINING—II

The Minerals Industry in Asia and the Far East in 1953

The following notes constitute the second and final instalment of an article dealing comprehensively with the development of the mining industry in Asia and the Far East. Progress in the various countries of the region was discussed in our issue of February 12, 1954, while the article below is concerned with the individual metals. The information on which both articles are based comes from the conference held in Tokyo last year under the auspices of the Economic Commission for Asia and the Far East (E.C.A.F.E.) which has been brought up to date in the latest annual report prepared by the Commission's Secretariat for 1952-1953.

Mineral production in Asia and the Far East on the whole showed a substantial improvement during the period 1952-53 in comparison to the years immediately preceding. Tungsten, manganese, chromium and tin production remained at about the 1951 level, while aluminium production showed some increase. This trend was expected to continue into 1954, although tin and tungsten production is likely to fall.

Tungsten

The drop in the world prices of most of the major metals has affected the region. Thailand's production of tungsten remained firm throughout 1952, but several mines in the northern provinces have been compelled to cease operations. The situation in China is unknown. In December, 1952, the Utah Construction Co. contracted with the United States and South Korean governments to expand mining and milling practice at the principal government-owned deposits in Korea (Sandong and Talsun). This is part of Korea's \$2,000,000 programme to double the present annual production. About 3,790 tons of tungsten concentrates (65 per cent WO_3) were produced in 1952, as against 1,061 tons in 1951. The concentrates will be exported exclusively to the United States under a trade agreement. Shipments from Burma during 1952 went mainly to the United Kingdom and comprised 1,744 tons of wolframite and 415 tons of mixed tin and wolframite. During the first quarter of 1953 631 tons of wolframite and 164 tons of mixed ores were exported from Tavoy.

Manganese and Chromite

India remains one of the world's major suppliers of manganese, her exports of good grade ore amounting in 1952 to 1,134,000 tons, 71 per cent of which was shipped to the United States. The Indian Bureau of Mines has undertaken experiments on the beneficiation of low-grade manganese ore from Madhya Pradesh. Low-grade ores from Katchindana mines were taken up for study and the results of the investigations have been published. A heavy media separation plant was being installed by the Central Province Manganese Ore Co. Ltd. at its Dongri Buzurg mines for the beneficiation of low-grade ore.

Manganese ore production in the Philippines fell from 22,343 tonnes in 1951 to 20,627 tonnes in 1952, but reached 12,290 tonnes in the first six months of 1953. A sintering plant to up-grade low-grade ore is planned by General Base Metals Inc., the largest post-war manganese producer in the Philippines.

South Korea's output of manganese ore has been considerably increased. In 1952 6,841 tons of ore containing 40 per cent Mn were produced (2,247 tons in 1951).

Japan produced about 180,000 tons of manganese ore and 7,000 tons of high-grade chromium ore against its requirements amounting to 300,000 tons of manganese ore and 1,800 tons of chromium ore for ferro-alloys and chemicals.

The region's two largest producers of chromium ore are the Philippines and Pakistan. In 1952 the former country produced 543,514 tonnes of refractory and metallurgical chromite. Output for January-June, 1953, was 267,546 tonnes. The main producers were the Acoje Mining Co., Consolidated Mines Ltd., and Luzon Stevedoring Co. The Mayon Mining Co. has started to operate the Florannie chromite mine and will go into production this year for export to the United States. Several small producers have shown renewed interest in chromite. Pakistan produced 17,419 tons of chromite in 1952.

Investigations of chromite deposits in the Singhbhum district of Bihar and Keonjar district of Orissa have resulted in the location of 2,120,000 tons of reserves instead of the previously estimated reserves of 200,000 tons.

Tin

The E.C.A.F.E. region remains the world's most important source of tin. During January-April, 1953, it produced 34,316 tons of tin in concentrates, of which 18,624 tons came from Malaya and 9,661 tons from Indonesia. The steady fall in the market price of tin during 1953 is adversely affecting production. In Thailand several mines have closed down, and the Cabinet Council decided in August, 1953, that the tin royalty should be reduced to aid miners. In Malaya, the Chamber of Mines petitioned the Government to reduce the present burden on producers. During March, 1953, the first month of government operation of Indonesia's tin mines on Banka Island, the production of tin concentrates was 2,342 tons, compared with 2,886 tons in the corresponding month of 1952. Tin exports from Burma during January-April, 1953, were estimated at 320 tons. The Kochiu tin mine in Yunnan has been mainland China's most important tin producer.

Bauxite and Aluminium

The region's contribution to the world production of primary aluminium, though still small, is steadily increasing. Japan's production reached 42,000 tons in 1952 and was expected to rise to 47,000 tons last year. The aluminium industry in this country is concentrating on rationalization.

India is producing about 70,000 tons of bauxite annually, less than half of this production being used in the manufacture of aluminium metal. The expansion of aluminium production envisaged in the Five-Year Plan will increase this demand to 45,000 tons by 1955-56.

Formosa produced 3,856 tons of aluminium ingots in 1952, this being a post-war record. In the Philippines the Reynolds Metals Co. is setting up a factory in the Manila area with an investment of U.S. \$3,000,000. All the bauxite produced in Indonesia is exported to the U.S. and Japan.

A small bauxite mine in Johore started operations in 1952 and production is said to be rapidly expanding. At Pengerang the Aluminium Laboratories Co. has proved an economic deposit of bauxite and has obtained a lease over 3,000 acres. Its parent company, Alcan, recently concluded

an agreement with the Nippon Light Metal Co., to whom the ore is likely to be shipped.

Copper

The region's contribution to the world's copper production remains small, being equivalent to less than 5 per cent. Japan is still its leading producer and consumer of this metal. The domestic demand in this country is very active and production has been making rapid strides. Output for the 12 months ended March, 1953, was recorded at 90,484 tons, including about 1,690 tons produced from imported copper ore. Japan is planning to import copper ore from Chile. It is estimated that the industry will turn out 95,000 tons of electrolytic copper in the 12 months ending March, 1954, but there will be little export surplus.

The Nippon Mining and Smelting Co. carried out an intensive prospecting programme during the year and continued developing its properties. Promising bodies were found at each of its seven copper mines. The Furukawa Mining and Smelting Co. has been exploring its promising mines and is planning an expansion programme. This company put heavy media separation into practice a few years ago in order to recover as much metal content as possible from lower-grade ore of the Ashio mine. A significant metallurgical development was the application of the fluosolid technique by the Dowa Mining and Smelting Co., whose installation at the Kosaka smelting plant cost Y714,394,000 and was completed in October, 1952. Before the installation of this new process, the plant had used only the pyrite smelting method and recovered copper only from the complex ore of the Hanaoka mine (copper, lead and zinc). The latter property is one of the few open-pit mines in Japan and is a leading copper producer. Since the war its mining equipment has been modernized and output has been as much as 17,000 tons of pyrite ore (35 per cent S) and over 10,000 tons of copper ore per month.

The production of copper in the Philippines during 1952 was estimated at 13,241 tonnes of contained metal, and for January-June, 1953, it totalled 5,850 tonnes. Several mining companies under the Soriano Group have pooled their resources to form the Atlas Mining and Development Co., which is to develop low-grade copper deposits in Toledo, Cebu. Present plans call for a mill of 2,000 tons daily capacity and production will start early in 1954. Metallurgical tests on the ore are being undertaken. Diamond drilling is being carried out by Elizalde and Co. at a low-grade copper property in Sipalay, Negros Occidental, and the same company is exploring another copper property in Zambales.

The production of refined copper in India and of electrolytic copper in China (Formosa) has remained at about the same level. A new copper deposit has been discovered in the Kansu Province in north-west China.

Lead and Zinc

The change in the lead situation from a seller's to a buyer's market seriously affected Japan, which is the principal producer and consumer of this metal in the region. Japan had to re-export lead at prices lower than the import prices paid in 1951. Production in the 12 months ending March, 1953, was 19,849 tons, but a third of the output had to be carried over to the next Japanese fiscal year. It was also expected that due to the fall in prices zinc production in Japan would be lower last year than the 1952 level of 59,492 tons of metal. Increased production and increased imports of foreign ore resulted in an over-supply to domestic consumers, and at the request of producers, 18,900 tons of zinc ore and 4,147 tons of slab zinc were exported during 1952.

Producers in the Philippines and India have also been

affected by the reduced prices of lead and zinc. In 1952 India produced 1,150 tons of refined lead and exported 3,300 tons of zinc concentrates. A committee has been set up by the government to advise on the erection of a zinc smelter. Production in the Philippines during January-June, 1953, was 1,275 tonnes of contained lead and 724 tonnes of contained zinc.

Hong Kong's production of lead concentrates rose to 752 tons in 1952 compared with 176 tons in 1951. Lead deposits now being investigated in this territory may prove to be an important source of supply.

Titanium

India produces over 200,000 tons of ilmenite a year, all of which is exported. The titanium plant at Trivandrum in the State of Travancore-Cochin was closed after being in operation for only about a year. The Government of India decided to refer to the Tariff Commission for enquiry and report the question of granting protection in any suitable form for the encouragement of a titanium oxide manufacturing industry.

Japan has been subsidizing titanium production in various ways. Although titanium products from the experimental plants had previously been exported to the United States, 1953 was the target year for the full industrialization of the metal. It is anticipated that Japan will be able to export titanium at around \$3 per lb. in the near future. The Ishiwara Sangyo Co. signed a contract with an American firm to produce 500 tons per month of titanium white at Yokkaichi by May, 1953. Ilmenite will be imported from the Anan mine, Sumatra. The ore is a by-product of the tin smelter and is therefore cheap. At the Okayama works of Teikoku Kako KK a pilot plant is producing 200 tons of rutile monthly.

Gold

The period under review has been a difficult one for the gold mining industry in the E.C.A.F.E. region and elsewhere. In the Philippines, for the first time since 1946-47, the value of base metal production overtook and surpassed gold and silver production by more than P6,000,000. Although the production of gold has been rising consistently with the re-opening of pre-war mines and the enlarged capacities of most operating gold mines, the average price of gold in the local market dropped considerably. For this reason the total value declined in 1952, although the quantity produced rose to 469,408 f.oz. compared with 393,602 f.oz. in 1951. In January-June, 1953, there was a production of 241,713 oz. The industry was affected adversely by the Minimum Wage Law.

In Japan almost all major gold mines have shut down.

There was increased production in South Korea and Malaya, but the amount was small. The Chinkuashih mine, Taiwan's principal source of auriferous ores, produced 169 kg. of gold in the first six months of 1953.

Miscellaneous Minerals

The Tokyo Gas Co. plans to extract germanium from ammonia liquor, employing a process recently developed by Sogo Sekitan Kenkyusho (Coal Research Institute Inc.). The pilot plant will produce the metal at the rate of 550 kg. per year. Some other Japanese companies are conducting similar researches.

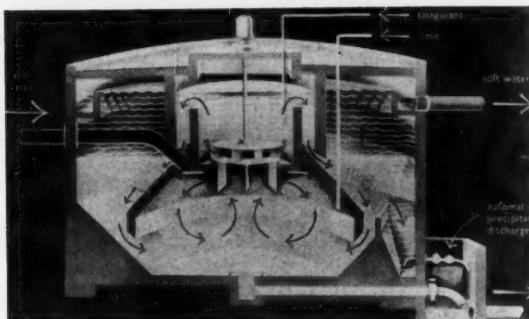
Interest has been shown in the niobium-tantalum-bearing minerals in the region. In the Federation of Malaya a small quantity of columbite has been produced and tests are being made to extract columbium and tantalum from tin slags. In the Republic of Korea there has been some production of columbite by the Korea Rare Element Ore Development Corporation.

TECHNICAL BRIEFS

Clarification of Mine Waters

One of the difficulties often associated with the ordinary continuous flow lime-soda water softener is the slowness of precipitation of the calcium carbonate, and more particularly of the objectionable magnesium (as hydrate).

In general two methods can be adopted to overcome these difficulties. First, the use of coagulants such as aluminium sulphate, sodium aluminate and/or activated silica, which are added to the water just before or just after the addition of the lime and soda. The use of such coagulants produces a much coarser and denser precipitate which settles fairly rapidly, but when a water contains a high magnesium content there is always a portion of it remaining in the colloidal condition. The second method is known as "seeding." That is, when a crystal of a substance is dropped into a supersaturated solution of that substance it is said to be a "seed crystal" and rapidly reduces supersaturation by causing precipitation. It is common practice to maintain a bed of sludge at the bottom in order to provide the desired seed crystals.



The Paterson Accelerator

The Accelerator plant, manufactured by the Paterson Engineering Co. Ltd., incorporates the method of allowing precipitation to occur in the presence of comparatively fresh pre-formed slurry and means are provided for circulating this fresh slurry with the water being softened. Provision is made for maintaining this sludge bed in a mobile condition and in such a manner that it actually squeezes the softened water from the bed, thus giving a relatively clear softened water in the upper part of the plant.

In general, the plant consists of a vertical and relatively wide diameter main outer steel plate cylinder containing an inner reaction portion formed also of steel plate. The raw water enters by an inlet pipe at the side of the main cylinder and passes to the agitator hood.

The chemical reagents (lime and soda ash) enter by a pipe into the top portion of the agitator hood and the action of the agitator gives instantaneous and intimate mixing of the raw water with the reagents and also the slurry, which is forced up into the upper secondary mixing zone by the action of the rotor agitators immediately below. Also at the top of the secondary mixing zone coagulant solution (aluminium sulphate or sodium aluminate) is added continuously where a more or less gentle agitation is given by the simple agitators already mentioned, operating in conjunction with the baffles.

Normally the lime and soda solutions are added in the form of a magma, but if required they can be added separately so that in the case of a variable water the dose of either lime or soda can be altered independently to each other. The speed at which the softening process is carried out is shown by the fact that when samples are taken from the top of the centre tube it will be found that the reaction is almost complete. A sample of circulating slurry from the centre tube when allowed to settle in a cylinder starts to clear in a matter of seconds and within five minutes the supernatant liquor is clear.

Applications to the mining industry of this unit are softening by lime-soda process for boiler feed water, the clarification of river water for cooling purposes, and the clarification of waste water from mines.

A Percentage Elongation Tablet

One of the most commonly specified mechanical properties of steel is the percentage elongation, as found by a tensile test of the material. Unfortunately, it is frequently incompletely specified so that anomalous differences exist between the values required by different standards, and the severity of the requirements of a particular standard may vary with the test piece used. For a given carbon, or low alloy molybdenum or chrome molybdenum steel having a tensile strength in the range of from 20 to 40 tons per sq. in., the percentage elongation will be the same, when determined from cylindrical or rectangular test pieces of any normal dimensions, provided that for each the gauge length, L, bears a constant ratio to the square root of the cross-sectional area, A. This ratio is generally 4, where used in British Standards, i.e. $L=4\sqrt{A}$.

On this basis the recent revised edition of B.S. 806 specifies all percentage elongations as measured on a gauge length equal to $4\sqrt{A}$, thus making them directly comparable. This presents no difficulty for circular test pieces, machined all over. For rectangular test pieces, such as those from plates, it is necessary for economy in testing to standardize a few lengths and widths, letting the cross-sectional area vary with the thickness. The percentage elongations so determined are not directly comparable, even with each other. It is, therefore, necessary to convert them into equivalent values which would have been found on a gauge length of $4\sqrt{A}$, when all the results are directly comparable.

Provision for this has now been made in B.S. 806: 1954, Appendix D, which is based on the analysis of many experimental results. A tablet card has been issued by Stewarts and Lloyds Ltd. showing directly the percentage elongations on $4\sqrt{A}$ equivalent to given elongations on 2 in. The nomogram enables the conversion to be made for any usual rectangular test piece.

De-leading of a Copper Concentrate

The method of de-leading a copper concentrate employed by the Britannia Mining and Smelting Co. has been described by P. S. Jack (*Can. Min. Met. Bull.* No. 494, 373, 1953). The copper concentrate obtained from flotation contains 27.5 per cent copper as chalcopyrite, 8 per cent pyrite, 5 per cent galena and 3 per cent zinc together with 4.5 oz. of silver and 0.38 oz. of gold per ton. The concentrate containing 20 per cent solids is pumped through a 1 ft. diameter Dorrclose, the amount of total solids handled per day being 90 tons. The cyclone underflow, which amounts to 50 tons per day and contains 6 per cent lead and 24.5 per cent copper, is divided between seven Wilfley tables. The concentrates are then divided between two cleaner tables. The cleaner concentrate amounting to two tons per day contains 65 per cent lead and 2.7 per cent copper while the plant tails amounting to 88 tons per day contain 3.5 per cent lead and 28 per cent copper.

The Prevention of Bacterial Corrosion

According to W. F. Higgins (*Corrosion*, 9, 243, 1953), anaerobic bacteria such as spirovibrio desulphuricans do not, of themselves, cause corrosion but merely aggravate it by taking advantage of anaerobic conditions and the presence of sulphates. What this type of bacteria really do is to act as cathodic depolarizers and there are a number of complimentary methods of suppression. These consist of making the pipe line or other structure truly cathodic, making the ground in immediate contact sufficiently alkaline and promoting the migration of sulphate ions from the pipe wall. All of these conditions are readily brought about by employing cathodic protection.

METALS, MINERALS AND ALLOYS

COPPER.—The strong rumours of recent weeks regarding cessation of the Government Broker's operations on the L.M.E. were confirmed this week in an official statement from the Ministry of Materials. The Ministry considers that by the end of May consumers will have had adequate opportunities to make their own supply arrangements and there should no longer be any need for official support of the market. Accordingly, this support will be withdrawn as from May 31 next.

In some quarters it had been expected that the Government Broker's support would be withdrawn at an earlier date, a factor which has undoubtedly contributed to some consumer anxiety and to the firmness of the spot price. Now that the announcement has come it will be a relief to the market that adequate warning has been given. Although some consumers take the view that the Government should not have contemplated withdrawing from the market so long as the spot position remains tight, it is equally arguable that the spot position will remain tight so long as the Government Broker is there to relieve any critical inventory positions, and it may well be that this week's announcement will have the effect of bringing home, both to consumers and to the market, the necessity of maintaining adequate working stocks. Certainly it cannot be said, in the light of recent events in America, that we are suffering from underproduction of copper.

The Government will have large stocks of metal when they cease to supply consumers, probably something between 150,000 and 200,000 tons, and these will presumably be transferred to the stockpile.

In the United States, expectations of a fall in copper have been widespread for a long time and derive additional support from a study of the latest market reports. The trade believes that domestic demand for copper will drop considerably this year, estimates ranging from 10 per cent to 40 per cent.

The so-called "copper statute"—the Chilean Government's Bill providing for changes in taxation and exchange rates for the big Chilean copper companies—has been introduced in the Chilean Congress which reconvened this week after a month's recess. Under the proposed legislation the copper companies will pay a single overall tax on income at the rate of 75 per cent on the basis of a yearly output of 375,000 s.tons. Should production exceed this figure the excess will be taxable at 50 per cent. The Bill also calls for the investment by the companies of 20 per cent of their profits in the expansion of installations in Chile. Moreover, the companies will not be permitted to reduce production in Chile should copper prices fall on international markets. It is proposed to create a Copper Institute to direct production and sales of the metal and to carry out technical functions. As may be imagined the American companies operating in Chile are reported very dissatisfied with some of the sections of the Bill, especially those dealing with investments and forced production.

In this latter connection considerable significance clearly attaches to the recent application by the Braden Copper Company to the Chilean Government for permission to cut production by 31 per cent because it is making no sales. Similar petitions are believed to be impending from Anaconda in respect of the Chuquicamata and Potrerillos properties.

Assuming that the "copper statute" is passed by the Congress, the way will then be clear for the re-opening of negotiations with Washington over the disposal of the accumulated stocks of Chilean copper which may now be as high as 160,000 tons. One factor in the situation which must become of increasing importance is the length of time for which Chile can afford to continue to freeze a major source of revenue. Considerable labour unrest was reported last week from Santiago with over 20,000 workers on strike for pay increases.

LEAD.—The market for lead in the States has shown up rather better this week with consumer demand for March notably better than during the first two months of the year, although export demand has weakened. The domestic price has remained firm at 12½ c.

A.B.M.S. figures now released for last year show total imports of lead into the States, in all forms, at 549,181 s.tons compared with 615,624 s.tons in the previous year.

TIN.—The outlook for the metal remains as obscure as ever. After the conference of U.S. tin consuming industries and of importers, called by the Defence Services Administration of the Department of Commerce on Wednesday of last week to consider the U.S. participation in the International Tin Agreement, it was announced that the proposal was rejected. This result, coming on top of the Randall Report, makes U.S. participation in the scheme increasingly improbable. However, the reaction of the market was to raise the London quotation by £15 a ton on Monday to £685/690 for cash, with three months £662.10/665 a ton. It is not yet evident on what this optimism is based. The price has risen some £125 a ton from last year's low, and must be bringing welcome relief to marginal mines.

No agreement was reached in the discussions between the R.F.C. and the Indonesian Government last week regarding further purchases of metal and concentrates. These negotiations have been dragging on for some six months, and though the Indonesian representatives profess themselves confident of an early agreement the R.F.C. do not look for any accord before the middle of the month or even later. It is not unreasonable to deduce that the Corporation wants to see some decision on the future of the Texas smelter before committing the Administration to take further substantial tonnages of oil. Senator Lyndon B. Johnson has let it be known that he is urging President Eisenhower to keep the smelter in operation pending a Congressional enquiry. In the event of the U.S. Administration deciding to cease operating the smelter with the end of the fiscal year—June 30—the question will then arise of whether the Tin Processing Corporation, or any U.S. private concern, may be willing to take over the smelter at a knock-out price.

ZINC.—Although there has been some little improvement in consumer demand for zinc in the past week which has held the price at 9½ c., smelters still appear to regard the supply-demand position as fundamentally out of balance. This is reflected in the further cutbacks announced by the American Zinc, Lead and Smelting Company at the beginning of this week, bringing this company's reduction in output since November to 3,100 tons per month and cuts announced by the industry as a whole to some 14,000 tons per month. In announcing these latest cuts the company is quoted as saying that "it is the judgment of the management that very little, if any, improvement can be expected in the market price until production of slab zinc in the U.S., plus slab zinc imports, is brought into line with domestic consumption."

Zinc imports for last year, as reported by the A.B.M.S., amounted to 509,208 s.tons of zinc in ore (448,699 s.tons in 1952) and 234,573 s.tons of zinc in other forms, blocks, pig, etc. (115,151 s.tons in 1952). Galvanizers had a better year, taking delivery of 2,290,868 s.tons of sheets, an increase of some 330,000 tons over each of the two preceding years, while zinc consumption in the U.S. as a whole last year is estimated by the *E. and M.J.* at 975,000 s.tons, against 848,000 s.tons in 1952. These figures suggest that American zinc consumption is still healthily enough and that it is the considerable increase in supplies last year, due mainly to bigger imports, which call for adjustment.

ALUMINIUM.—Total supplies of primary aluminium available to the U.S. market last year showed an increase of over 50 per cent on 1952. Domestic production is reported at 1,252,000 s.tons (937,000 in 1952), while imports total 301,000 s.tons (128,000) making a total of 1,542,000 s.tons (1,065,000). It is expansions of such proportions as this which provide the real measure of the extent of the challenge to the more traditional materials.

NICKEL.—Total consumption of nickel in the U.S. last year is stated by the U.S. Bureau of Mines to have been about 105,000 s.tons against 101,000 s.tons in 1952.

Further enlargement of the treatment plant of Inco at Copper Cliff has been announced by Mr. J. Roy Gordon, Vice-President and General Manager of Canadian operations. The concentrator has been enlarged to handle 12,000 s.tons of ore a day from the previous capacity of 10,000 s.tons; two additional crushers have been added to the former four, and 36 more flotation machines

increase the number to 180. As a result the output of refined nickel is now approaching an annual rate of 137,500 s.tons.

TUNGSTEN.—Mr. Heatcoat-Amory stated in the Commons on Monday that after consultation with the trade it had been decided to restore private trading in tungsten ores and concentrates on April 1 next. On that date private imports from all sources other than the dollar area would be permitted, but to ensure smooth transition from public to private trading arrangements were being made with the trade by which consumers in the early months would still meet a substantial part of their requirements by purchases from the Ministry's stocks. The proportion of such purchases would be reduced as the normal channels of supply are re-established.

The effect of the Minister's announcement has had a negligible effect on the market, U.K. consumers having already covered well forward. In America the price is slightly easier at \$15 and \$17 per s.ton unit.

Iron and Steel

In response to the ten per cent rise in railway freight charges which came into operation on Monday last, the Iron and Steel Board has adopted what may be described as an interim measure of price adjustment. Under the new order the price of basic iron is raised by 9s. per ton to £14 15s. 6d. and haematite iron has gone up 7s. 6d. per ton to £16 19s. 6d. delivered on the north-east coast. Other small increases are sanctioned for black plate, terne plate, certain categories of steel strip and stainless steels and stock holding extras, and in the case of billets for re-rolling in the alloy steel section prices are reduced.

The Board has been careful to point out that in the main the price increases derive from increases in production costs, and in the case of pig iron and stock holding extras, they also embrace the effect of the advance in rail freights.

But the general price structure for the principal classes of rolled steel remains unchanged. It is not denied that the extra transport charges will have an impact upon the cost of production and delivery of all steel products and this will be taken into consideration during the general examination of iron and steel prices which is now in progress. But in the meantime it is pointed out that the burden of costs has been relieved by the lower price of certain imported products. The Board, it is added, will continue to keep all costs under review and effect whatever adjustments in price that may be necessary from time to time.

There remains the question of the future level of ferrous scrap prices which, in justice to all concerned, the Minister of Supply should decide without further delay. He is in full possession of the facts. Weeks ago the case for an increase in the maximum home prices to cover the extra cost of transport was presented to him by the National Federation of Scrap Iron Steel and Metal Merchants and it is inimical to the best interests of the trade that the merchants should be left to carry the burden of increased transport charges, even if it be for only a few weeks. There is no suggestion that deliveries should be withheld or even delayed, but the temptation to do so is undeniable.

Imports of scrap are running at the rate of about 60,000 tons a month and home deliveries are well maintained, but the supply of pig iron falls short of current requirements, and even phosphorous grades are now scarce. Under these circumstances it is a welcome development that a new blast furnace with an estimated annual capacity of 250,000 tons has been blown in this week at Scunthorpe.

The London Metal Market

(From Our Metal Exchange Correspondent)

At a meeting held at the end of last week in Washington consumers are said to have been unanimous against the United States ratifying the International Tin Agreement. On the other hand there is a suggestion that State Department officials would probably be pleased to see the United States' ratification of the Agreement on political grounds. Discussions have been held in Washington between representatives of Indonesia and the United States on the possible continuation of the contract for the purchase of concentrates for the third year, but no decision was reached and the discussions are to be continued. In the meantime the markets both here and in the East have been very firm,

and a quite considerable advance in values has been seen with the backwardation in the London market increasing to around £30 per ton. On Thursday morning the Eastern price was equivalent to £673 $\frac{1}{2}$ per ton c.i.f. Europe.

The Ministry of Materials has announced that as from May 31 the Government Broker will cease to operate, the Ministry being of the opinion that by that time consumers should have had ample opportunity to arrange for supplies through normal trade channels. The date decided upon is rather later than many people anticipated. The market in London has been firm and consumer demand quite well maintained.

Lead and zinc staged a spurt at the beginning of the week, but this proved to be shortlived and these markets have since eased back. Demand from consumers both here and on the Continent seems reasonably good. From America reports of cuts in production of slab zinc are still being received, and the reductions in output which are being made must make themselves felt in the next few months provided there is no serious falling off in consumption.

Closing prices and turnovers are given in the following table:

	February 25 Buyers	Sellers	March 4 Buyers	Sellers
Tin				
Cash	£670	£672 $\frac{1}{2}$	£690	£692 $\frac{1}{2}$
Three months	£645	£646	£663	£664
Settlement		£672 $\frac{1}{2}$		£692 $\frac{1}{2}$
Week's turnover	590 tons		680 tons	
Lead				
Current month	£81 $\frac{1}{2}$	£81 $\frac{1}{2}$	£83	£83 $\frac{1}{2}$
Three months	£81 $\frac{1}{2}$	£81 $\frac{1}{2}$	£82 $\frac{1}{2}$	£82 $\frac{1}{2}$
Week's turnover	3,725 tons		2,750 tons	
Zinc				
Current month	£71 $\frac{1}{2}$	£72	£72 $\frac{1}{2}$	£72 $\frac{1}{2}$
Three months	£70 $\frac{1}{2}$	£70 $\frac{1}{2}$	£71 $\frac{1}{2}$	£71 $\frac{1}{2}$
Week's turnover	2,350 tons		2,225 tons	
Copper				
Cash	£232	£233	£238	£239
Three months	£219 $\frac{1}{2}$	£219 $\frac{1}{2}$	£223 $\frac{1}{2}$	£224
Settlement		£233		£239
Week's turnover	5,325 tons		4,675 tons	

OTHER LONDON PRICES — MARCH 4

ANTIMONY

English (99%) delivered, 10 cwt. and over	..	..	£210 per ton
Crude (70%)	£200 per ton
Ore (60% basis)	22s./24s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade)	£483 per ton
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OTHER METALS

Aluminium, 99.5% £156 per ton	Osmiridium, £40 oz. nom.
Bismuth (min. 4 cwt. lots) 16s. lb.	Osmium, £65/£70 oz. nom.
Cadmium (Empire), 13s. lb.	Palladium, £7 15s./£8 10s. oz.
Chromium, 6s. 5d./7s. 6d. lb.	Platinum, £30/£33
Cobalt, 20s. lb.	Rhodium, £42 10s. oz.
Gold, 248s. f.oz.	Ruthenium, £25 oz.
Iridium, £60 oz. nom.	Quicksilver, £64 10s./£65 5s. ex-warehouse
Magnesium, 2s. 10½d. lb.	Selenium, 30s. 6d. nom. per lb.
Manganese Metal (96%-98%) £225/£262	Silver 73½d. f.oz. spot and f.d. Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth	..	..	50% 7s. 3d. lb. c.i.f. 40% 6s. 3d. lb. c.i.f.
Chrome Ore—			
Rhodesian Metallurgical (lumpy)		£14 5s. 6d. per ton c.i.f.	
", (concentrates)		£14 5s. 6d. per ton c.i.f.	
", Refractory		£13 17s. 6d. per ton c.i.f.	
Baluchistan Metallurgical		£15 19s. 6d. per ton c.i.f.	
Magnesite, ground calcined		£26 - £27 d/d	
Magnesite, Raw	..	£10 - £11 d/d	
Molybdenite (85% basis)	..	102s. 4d.-103s. per unit c.i.f.	
Wolfram (65%)	..	World buying 102s. 6d. nom.	
Scheelite (65%)	..	120s. U.K. Selling	
		World buying price nom.	
Tungsten Metal Powder	..	115s. U.K. Selling	
(98% Min. W.)		13s. 8d. nom. per lb. (home)	
Ferro-tungsten	..	10s. 8d. nom. per lb. (home)	
Carbide, 4-cwt. lots	..	£35 13s. 9d. d/d per ton	
Ferro-manganese, home	..	£53 10s. 0d. per ton	
Manganese Ore Indian c.i.f. Europe (46% - 48%)	..	7s. 4d. - 7s. 9d. per unit	
Brass Wire	..	2s. 4½d. per lb. basis	
Brass Tubes, solid drawn	..	1s. 8½d. per lb. basis	

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The end of the unpopular three-week account brought about an easier trend in markets. Gilt-edged alone were better after first dipping on the announcement of the large ICI loan. New vigour was injected by the repayment of £72,000,000 National War Bonds. Much of this money found its way back into the market for reinvestment. The February gold reserves for the sterling area again showed a favourable trend but the improvement in some quarters was considered to be inadequate.

Kaffirs took time off for a breather. Finance houses generally turned easier and many individual Rand mines lost ground. This was mostly due to a difficult contango position and the February Rand returns had little effect upon the market. Dominion Reefs picked up again at 34s. 6d. following news of change of control. Hartebeestfontein shares opened at a premium of 5s. 3d. and later rose to 6s. 6d. premium on strong demand. The opening price was rather lower than had originally been anticipated. Johannesburg showed interest in Far West Rand and the best Orange Free State shares. Markets are, however, restricted by the imminence of the South African budget. Randfontein, after touching 70s., eased off. The uranium plant is now operating and it is estimated that some 20,000 tons of slimes will be pumped each month from East Champ D'Or. This latter mine recorded a higher loss for February despite the beginning of this operation. Older Rand mines lost some of last week's gains. New State Areas February return is the last. Mining operations have now ceased. The monthly figures for the Strathmore group are encouraging; both Ellaton and Stilfontein recorded improved profits. Another good feature was Doornfontein with higher profits and lower working costs.

Orange Free State shares suffered from the general decline but turnover remained fair. Expectations of exceptional results from President Brand continued to be canvassed in Johannesburg. St. Helena rose in front of the monthly report on hopes of improved returns and uranium rumours. Welkom still

recorded a loss, although somewhat reduced. Elsewhere, falls can mainly be accounted for by large outstanding bull accounts.

West African's encountered rather more interest following the Gold Coast Prime Minister's statement concerning measures to safeguard foreign capital. Ashanti improved sharply due to very good development results.

Diamond shares were again in demand with Anglo-Trust up on selective buying. De Beers deferred reached their highest point in their new form at over 80s.

Coppers were rather patchy but the price of the metal has held up well. Events in Chile, however, reminded investors of the large metal stocks remaining to be liquidated. Esperanza, with the new issue out of the way, went ahead well, encouraged by news that the new plant is in partial operation and that fresh development areas are about to be explored by drilling. The Chartered figures disclose assets of £29,000,000 and cash of over £5,000,000. These good results had a steady effect on the share price. Strong Cape buying of Bancroft caused the shares to rise to 12s. 10½d.

Eastern Tins rose on the higher metal price. The tin price is, for the moment, much more favourable to operations than that of a year ago. The Nigerian section were also affected but columbite producers were especially popular. Bisichi rose sharply following tips in the popular press. British Tin Investment produced better figures but much of the improvement can be attributed to easing of taxation and it is uncertain whether the figures can be maintained this year. Beralts remained unchanged by the decontrol of tungsten.

Central Provinces Manganese rose on favourable mention in the financial press supported by consideration of the new plant being installed and the present good relations with the Indian Government. Not long ago uncertainty over the metal price and world production scales caused a slight fall in the shares. Murchison jumped on Cape buying and rumours of good antimony prospects.

FINANCE	Price Mar. 3	+ or -	O.F.S.	Price Mar. 3	+ or -	MISCELLANEOUS GOLD (contd.)	Price Mar. 3	+ or -	TIN (Nigerian and Miscellaneous) contd.	Price Mar. 3	+ or -
African & European	28	+ 16	Freddies	9/3	- 9d		19/6	+ 16	Geevor Tin	9/10½	- 4½d
Anglo American Corp.	62	- 4	Freddies N.	10/9	- 1½d	St. John d'El Rey	32/3	- 3d	Gold & Base Metal	3/3	- 1d
Anglo-French	206	- 1	Fredries S.	9/6	- 6d	Zams		- 3d	Jantar Nigeria	8/6	+ 1½d
Anglo Transvaal Consol.	25½	-	F. S. Geduld	4½	+ 2½			- 3d	Jos Tin Area	12/9	- 1d
Central Mining (£1 shrs.)	29/3	- 3d	Geoffries	18/	-	DIAMONDS & PLATINUM		+ 16	Kaduna Prospectors	2/1½	- 1d
Consolidated Goldfields	49/4½	-	Harmony	30/-	- 1/4d	Anglo American Inv.	23/3	-	Kaduna Syndicate	2/	- 1d
Consol. Mines Selection	31/3	- 7½d	Lorraine	12/9	-	Casts	4½	-	London Tin	5/9	+ 3d
East Rand Consols.	3/7½	- 1½d	Lydenburg Estates	17/3	- 1/4d	De Cons. Diam. of S.W.A.	81/6	+ 2½d	United Tin	3/4½	-
General Mining	3/8	-	Merriespruit	10/10½	- 7d	De Beers Dfd. Bearer	16½	-			
H.E. Prop.	38/9	- 16	Middle Wits	14/9X	-	De Beers Pfd. Bearer	8/9	+ 16	SILVER, LEAD, ZINC		
Henderson's Transvaal	8/7	-	Ofsits	2½	-	Pots Platinum	13/9	- 3d	Broken Hill South	2/½	-
Johnnies	49/4½	- 1/10	President Brand	52/6	- 6d	Waterawa		- 6d	Burma Mines	2/7½	+ 7½d
Rand Mines	3/16	-	President Steyn	33/½	-			- 3d	Consol. Zinc	27/9	+ 9d
Rand Selection	34/4½	- 7½d	St. Helena	20/3	+ 6d	COPPER	64/3	- 3d	Lake George	6/	-
Strathmore Consol.	35/	- 1/3	Virginia Ord.	13/9	- 1/11	Chartered	7/4½	- 7d	Mount Isa.	32/6	+ 6d
Union Corp. (2/6 units)	30/6	- 6d	Welkom	17/9	- 6d	Esperanza	4/7½	+ 1½d	New Broken Hill	22/3	+ 3d
Vereeniging Estates	4/6X	-	Western Holdings	4 3½	-	Indian Copper	3 3½	+ 2½	North Broken Hill	2 ½	-
Wrts.	33/9	- 1/6			-	Messina	6 ½	- 6d	Rhodesian Broken Hill	8/10½	- 6d
West Wits	38/9	- 7d			-	Nchanga	49/	- 3d	San Francisco Mines	17/6	+ 1½d
RAND GOLD					-	Rhod. Anglo-American	13/6	-	Uruwira	3/6	- 3d
Blyvoorts	33/3	-	Amalgamated Banket	1/7½	-	Rhod. Katanga	14/3	-			
Brakpan	9/	- 9d	Ariston	5/7½	-	Rhodesian Selection	18/	-	MISCELLANEOUS BASE METALS & COAL		
City Deep	18/9	- 6d	Ashanti	19/-XD	-	Rhokana	20½	-	Amal. Collieries of S.A.	41/6	- 6d
Consol. Main Reef	18/9	- 1/3	Bibiani	4/1½XD	-	Rio Tinto	14/9	-	Associated Manganese	46/3	- 3d
Crown	40/	- 7d	Bremang	2/1½	-	Roan Antelope	36/3	-	Cape Asbestos	23/7½	- 4d
Daggas	3/4	- 8d	G.C. Main Reef	3/4½	-	Selection Trust	61/6	-	C.P. Manganese	56/3	+ 3½d
Doornfontein	25/6	- 3d	G.C. Selection Trust	6/3	-	Tanks	50/-	-	Consol. Murchison	39/4½	+ 2½d
Durban Deep	35/	- 1/3	Konongo	2/3	-	Tharsis Sulphur Br.		-	Mashaba	3d	-
E. Daggas	13/3	- 9d	Lyndhurst Deep	1/-	-			-	Natal Navigation	2½	-
E. Rand Props	26/	- 2½	Marlu	1/6	-			-	Rhod. Monteleo.	1/9	-
E. Geduld	(4/- units)	- 6d	Taquah & Abosso	2/4½	-			-	Turner & Newall	72/6	-
E. Rand	2½	-			-			-	Wankie	13/1½	- 1½d
Govt. Areas	12/3	- 3d			-			-	Witbank Colliery	34½	-
Grootvlei	20/	-	AUSTRALIAN GOLD		-			-			
Libanon	9/10½	-	Boulder Perseverance	3/-	-			-			
Luipaards Vlei	23/9	-	Gold Mines of Kalgoorlie	13/6	-			-			
Marieval	18/3	-	Gest Boulder Top	8/6	-			-			
Modderfontein East	13/9	-	Lake View and Star	13/3	-			-			
New Kleinfontein	15/7½	-	Mount Morgan	18/3XD	-			-			
New Pioneer	16/3X	-	North Kalgurl	6/3XD	-			-			
Randfontein	68/	- 1/	Sons of Gwalia	5/9	-			-			
Randfontein	14/9	- 6d	South Kalgurl	6/9	-			-			
Robinson Deep	14/4½	-	Western Mining	11/6	-			-			
Rose Deep	4/6	-			-			-			
Simmers & Jack	22/6	-	MISCELLANEOUS GOLD		-			-			
S.A. Lands	5/1½	-	Cam and Motor	9/3	-			-			
Springs	26/3	-	Champion Reef	4/6	-			-			
Stillfontein	39/4½	- 1/3	Falcon Mines	7/6	-			-			
Sub Nigel	5/1½	- 10½d	Globe & Phoenix	23/-	-			-			
Van Dyk	12/9	-	G.F. Rhodesian	5/9	-			-			
Vlekfontein	14/9	-	London & Rhodesian	4/6	-			-			
Venterspost	37/6	-	Motapa	2/3	-			-			
Vogelstruisbuil	2/8	- 3d	Mysore	4/6	-			-			
West Driefontein	2/8	-	Nandydroog	5/9	-			-			
W. Rand Consolidated	2/8	-	Overeem	3/6	-			-			
Western Reefs	2/8	-	Oroville	16/7½	-			-			
					-	TIN (Nigerian and Miscellaneous) contd.		-			
					-	Amalgamated Tin	14/6XD	+ 3d	Anglo-Iranian	10½	+ 2d
					-	Beralt Tin	19/9	-	Attoc	44/4½	+ 2d
					-	Bisichi	6/	-	Burmah	78/	+ 4½d
					-	British Tin Inv.	12/9XD	+ 9d	Canadian Eagle	19/9	+ 1½d
					-	Ex-Lands Nigeria	2/9	+ 1½d	Shell (beaver)	5½	-
					-			-	Leasehold.	19/4½	- 7½d
					-			-	T.P.D.	25/	- 6d
					-			-	Ultramar	27/4½	- 10d

COMPANY NEWS AND VIEWS

Falcon Mines Consider Dividend Payment

Shareholders in Falcon Mines have gone dividendless since the year ended September 30, 1948, when the company paid 5 per cent out of earnings of nearly 10 per cent realized from its two regular producing mines, Sunace and Bay Horse. Since that time, the company has directed all its efforts to bringing the Dalny Mine into production. This was accomplished on June 3, 1952, when the permanent reduction plant, having a nominal capacity of 12,000 tons per month, was started up. Unfortunately, the company was compelled to start up its reduction plant without a roaster and without the necessary plant to treat flotation tailings. However, in November, 1952, the plant to treat flotation tailings was brought into commission and it was hoped that the roaster would be completed by the end of 1953. But the main units for the roasting plant were not delivered from the United States until December last and Mr. E. D. Papenfus, chairman, in his review to shareholders accompanying the report and accounts for the year ended September 30, 1953, said that it was now expected that trial runs would commence towards the end of next month.

The installation of the roasting plant will mean a great deal to the company. Aside from giving the company control over the whole of its production process, it will mean that it will be able to re-treat the concentrates currently being stockpiled which at the end of September last amounted to 5,075 tons, having an estimated average value of 22 dwt. per ton.

More than that, when the Fluo-Solids Roaster is installed and operating satisfactorily the company intends to seriously consider the payment of a dividend.

Year to Sept. 30	Mining Profit	Gross Revenue	Net Profit		To Reserves	Carry Forward
			£	£		
1953	71,416	72,700	9,931	62,769	50,000	22,835
1952	70,030	75,691	8,781	66,910	120,000	10,066
1951	51,565	58,347	8,210	50,137	50,000	63,374

During the year ended September 30, 1953, as can be seen from the table immediately below, the company operated very closely to the capacity of the mill with beneficial affects on working costs. The milling grade is still well below the grade of the ore reserves and when the roaster is running satisfactorily the yield per ton milled should show improvement. The roasting plant, which will cost approximately £75,000 and is being financed largely out of overdraft facilities, is the one remaining substantial item of capital expenditure so that once this has been paid, allocations to reserve can be reduced.

Year to Sept. 30	Milled (tons)	Per Ton Milled	Capital		Ore Reserves (000) (dwt.)
			Grade (dwt.)	Yield (oz.)	
1953	142,000	2.47	17,535	27 2	24,150 565 4.5
1952	62,300†	2.55	7,950	29 0	139,147 536 4.0
1951	28,070‡	3.11	4,365	34 3	243,000 483 4.2

* Includes development charges. 1953-3s. 10d.; 1952-4s. 11d.; 1951-5s. 2d.
† Including 4 months operation of main production plant.
‡ 10 months operation with pilot plant.

Sunace and Bay Horse Mines contributed useful profits from operations during the year although the working profit at Sunace declined to £24,811 against £45,813, but that of Bay Horse expanded modestly to £7,783 compared with £7,220.

One of the most encouraging features of the year's operations at the Dalny Mine was that development operations showed that ore bodies in the Dalny Section continue in depth and that the value of the ore opened up on levels 7 and 8—the lowest levels of the mine—was very satisfactory.

Another interesting point referred to by the chairman was that the Southern Rhodesia Income Tax Act, 1953, relating to the depletion allowance of 10 per cent on the value of gold produced, was amended so that the company may now claim it.

Meeting, Bulawayo, Southern Rhodesia, March 30.

British Tin Investment's Tax Relief

The full report and accounts of British Tin Investment Corporation for the calendar year 1953 revealed that the substantially better results obtained during a period of falling tin prices was due largely to the net taxation charge being reduced to only £180,920 compared with £398,045 in 1952. The lighter tax burden was due to relief being given retroactively from January 1, 1952, to the Group by the Finance Act of 1953 under which the Corporation's liability in respect of E.P.L. for 1952 was only £15,420 compared with the provision of £106,000 which had been made in the company's accounts for that year. Thus the balance of £90,580 has been credited against the Group's full provision for taxation for 1953 of £271,500.

As previously announced in our issue of January 22 the net profit of the Corporation and its subsidiaries for the year was £366,725 against £214,982, which enabled the company to raise its dividend distribution to 30½ per cent compared with 18½ per cent in 1952.

During the year the main changes in the company's investment portfolio have been the realization of its shares in diamond producing companies and an increase in its holdings in copper and oil companies, although the chairman, Mr. S. H. Smith, in his address to shareholders accompanying the report and accounts, stressed that the company's fortunes are still largely bound up with tin mining in Malaya.

Mr. Smith in referring to the Corporation's prospects during the current year said that while it is to be anticipated that dividend income in 1954 cannot be expected to equal that received in 1953, he believed that the long term prospects were good and the board had high hopes of some of the new investments.

The group balance sheet showed that the holding company's investments totalled £2,906,654 (£2,940,608) which included securities quoted in London of £2,906,652 (£2,892,744) having a market value of £3,106,649 (£3,402,660).

The issued capital is £2,105,086 divided into shares of 10s. each. Meeting, London, March 24.

Burma Corporation Reports Small Loss

Burma Mines, whose principle asset is its holding of 3,159,730 fully paid "B" shares of K.10 each in Burma Corporation (1951) Ltd., has announced that a loss of £607 was incurred for the past year ended December 31, 1953, compared with a profit of £189 for the 18 months ended December 31, 1952. However, the £607 loss on profit and loss account was offset by a profit of £930 realized on the sale of British Government securities which has been added to capital reserves.

During the three months ended December 31, 1953, the company's working profit amounted to £50,685 which, together with the working profit of £49,582 announced for the September quarter, brought its total working profit for the six months ended December 31 last, to £100,267.

Mine ore extraction during the December quarter at 18,435 tons increased by 3.57 per cent over the previous quarter and the number of underground workers rose to 1,416 compared with 1,381 at September 30 and only 1,280 at the end of the June quarter. The company has also announced that the reconditioning of its No. 4 generator (4,000 kW.) at Mansam Falls generating station is now complete and is about to be put into commission. A report summarizing the operating results for the December quarter is given on page 278 in this issue.

New Union Can Control Dominion Reefs

Dr. M. F. Braun and New Union Goldfields informed the Board of Dominion Reefs (Klerksdorp) earlier this week that they are the owners of, or are otherwise in a position to influence the exercise of the voting rights attached to, over 50 per cent of the issued "A" and Ordinary shares.

It will be recalled that the Dominion Reefs mine, which is situated in the Klerksdorp District of the Far West Rand, announced in November last that it was to construct a £2,000,000 plant to treat uranium-bearing slimes. Since the mine was unable to pay its way as a gold producer, it is understood that the new plant will chiefly treat the accumulated uranium-bearing slimes from its past gold production.

B.G. Consolidated Investigating Columbite Concession

British Guiana Consolidated Goldfields is to explore a 75,000-acre columbite concession in Mazaruni, one of the colony's richest mining districts which has been vacated by the Kennametal International (South America) Company, according to Mr. J. R. Robinson, Chairman of B.G. Consolidated.

Mr. Robinson said that Kennametal abandoned its mining venture after eight months of prospecting as it was proving uneconomical. A new company would find the project difficult but his company was already operating here and thus without heavy initial expenses, should find the venture successful.

Mount Morgan Company

Under this heading in last week's issue a note from our Australian correspondent stated that the copper production of Mount Morgan for the first 28 weeks of the company's current financial year was 8,227 tons. This figure should have been 3,666 tons compared with 3,618 tons in the previous year.

BRITISH TIN INVESTMENT CORPORATION

REASONS FOR SHARP FALL IN PRICE

THE INDUSTRY IN MALAYA

MR. S. H. SMITH'S STATEMENT

The ordinary general meeting of the British Tin Investment Corporation Ltd., will be held on March 24 at Winchester House, Old Broad Street, London, E.C.

The following is the statement of the chairman, Mr. S. H. Smith, O.B.E., M.C., which has been circulated with the report and accounts for the year to December 31, 1953:

In June last Mr. E. V. Pearce, who desired relief from some of his responsibilities, resigned the Chairmanship of this Corporation and the Directors appointed me to succeed him. Mr. Pearce had been Chairman of the Corporation since 1940 when Mr. Oliver Lyttelton resigned on appointment as President of the Board of Trade. Shareholders as well as the Directors owe an immense debt of gratitude to Mr. Pearce for his wise conduct of the affairs of the Corporation throughout the difficult period of the War and the years of rehabilitation of the Tin industry which followed. It must be a great satisfaction to shareholders, as it is to the Directors, that Mr. Pearce has agreed to continue to serve as a Director so that we still have the full benefit of his unique experience, sound judgment, and abounding common-sense.

The profits (before tax) of the Corporation for the year ended December 31, 1953, amounted to £541,643, a decrease of £58,520 on those of the previous year.

After making full provision for taxation amounting to £271,500 based on the profits for 1953, and crediting a sum of £90,580, being the balance of the Excess Profits Levy provision for 1952 which is no longer required, the net taxation charge in the accounts for the year is £180,920. There thus remains a balance after taxation of £360,723 which, with the balance of £93,452 brought forward from 1952, makes available £454,175.

The interim dividend of 7½% and the special interim dividend of 7%, paid less tax in August and October respectively, together absorb £167,881. Your directors now recommend the payment of a final dividend of 16% less tax, which will absorb £185,247, and that the balance of £101,047 should be carried forward. If these recommendations are approved by members at the Annual General Meeting, on March 24, 1954, dividend warrants will be posted on March 26.

EXCESS PROFITS LEVY

Shareholders will remember that under the Finance Act 1952 the Corporation was, owing to its ownership of a small subsidiary Finance Company, not entitled to relief in respect of dividends from companies liable to Excess Profits Levy when computing its own liability to the Levy. Representations were made to the appropriate Revenue Authorities on behalf of the Corporation pointing out that the effect of the Act of 1952 was to subject the Corporation's income from such sources to double taxation.

This anomaly was rectified by the Finance Act 1953 under which proportionate relief was given retroactively from January 1st, 1952 to a group such as ours, where one company is not an investment company but where substantially the whole of the functions of the group consists in holding investments. In consequence, the Corporation's liability in respect of the Levy for 1952 was only £15,420 compared with the provision of £106,000 which had been made in our accounts at December 31st, 1952. The balance of £90,580 mentioned above has been credited to Profit and Loss Account in 1953, thereby reducing the net taxation charge in the year's accounts to £180,920. The provisions of the Finance Act 1953 enabled us to pay the special interim dividend of 7% in October last which really came from the profits earned in 1952.

During the year the main changes in the Corporation's investments have been the realisation of its shares in diamond producing companies and an increase in its investments in copper and oil companies. The usual list showing our principal investments in Tin Mining Companies and in Miscellaneous Mining and Oil Companies is set out at the end of this Statement.

PRICE OF TIN

The average price of Cash Standard Tin during the year 1953 was £731 as compared with a price of £962 in 1952. One of the main features of the year was the very sharp fall in the price of tin in comparison with the relative steadiness of the price during 1952. During the spring and early summer the cash price fell from a high point of £985 on February 9, to £568 on July 30. There has since been a moderate rally and, for the moment at any rate, price conditions are more steady. The primary cause of the fall in price was the knowledge that

at the end of 1953 or early in 1954 the fixed price contracts with certain countries for the purchase of tin for the U.S. Stockpile would cease.

As is so often the case, the fall was accentuated both in duration and extent, by a very drastic reduction in the demand for, as distinct from the consumption of, tin by the consumers, mainly those in the United States of America. Although the immediate outlook for the price of tin may be complicated by negotiations for the sale of tin in concentrates between the American Government and Indonesia, it is reasonable I think to say that the future course of the price must depend in a large degree on the ultimate results of the recent Tin Conference at Geneva.

This Conference, as shareholders are aware, was held under the auspices of the United Nations and was attended by representatives of all the main producing countries and of most of the consuming countries. A draft Agreement was drawn up which is now under consideration by the many Governments concerned. These Governments have to decide by June next whether or not they intend to ratify the draft Agreement.

It will, therefore, be several months before it is known whether sufficient ratifications are received to bring it into force. The Agreement, which aims at enabling world production to be adjusted more nearly to world consumption and at a reasonable stability of price at a level which will give a fair return to producers and not inflict hardship on consumers, makes provision both for a reduction in output if supplies are excessive, and for the formation of a Buffer Stock to take care of short term fluctuations in demand.

POSITION IN MALAYA

The list of this Corporation's principal holdings in Tin Mining Companies indicates that we are still deeply interested in Malaya. The political situation there continues to show improvement but there is as yet no ground for complacency and we would be a bold man who would endeavour to name the day on which Malaya will be entirely free from political unrest. The conditions under which all those concerned with the winning of tin in Malaya are living and working are still grim and I would like to renew my predecessor's tributes to the fortitude and patience shown by them and their families during the past five years.

There are, I suggest, at least two ways by which the Government of Malaya could materially aid its tin industry at this difficult stage. First, it can evolve a clear and comprehensive land policy which will not only encourage prospecting for and development of new tin-bearing areas, but, what is equally important, will give to those who are prepared to risk the large sums required in prospecting an assurance that they will be given a mining title over any payable tin-bearing land which they prove, as was the former practice.

There has been practically no prospecting for twenty years, during which time approximately one million tons of Tin (metal) have been extracted with the inevitable result that some mines are approaching exhaustion. It seems to me that prospecting for new areas ought to be actively encouraged. Political considerations, of themselves, would appear to make it essential to the future stability of Malaya that new areas shall be opened up and in this connection it must be remembered that there is a very considerable time-lag between the providing of a new area and the date of its equipment for production.

TIN DUTY

Secondly, it is to be hoped that the Government of Malaya will reconsider and modify the present rate of the tin duty. This duty was fixed when there was no income tax in Malaya; it is levied whether the ore has been produced at a profit or at a loss, and, nowadays, it is in addition to and not instead of income tax. The duty seems to demand from the Tin industry an undue share of the revenue required by the Malayan Government.

It is a platitude to say the Malayan tin is a strategic asset of prime importance and a magnificent earner of hard dollars, but it is a wasting asset and present policy is inducing some miners to work their best "patches" first, regardless of future outlook and sound mining practice. If new capital is to be attracted to Malaya, it will require to be given a reasonable prospect of a reasonable return upon money ventured in what must, by its nature, be an uncertain and somewhat hazardous business.

OTHER METALS

In view of the Corporation's investments in non-ferrous metals other than Tin, it may be of interest to shareholders to know that the average price of Lead during 1953 was £91 compared with the Ministry of Materials' selling price of £131 on the day before the London Metal Exchange Lead Market was reopened in 1952. Corresponding figures for Zinc were £75

and £110. In the case of Copper, the average London Metal Exchange price during the last five months of 1953, i.e. from the opening of the London Metal Exchange Copper Market until the end of the year, was £231 as compared with the Ministry's price prior to the reopening of £252.

It is therefore clear that whilst the fall in price in the case of Copper has so far been relatively small, the declines in Lead and Zinc have, in both cases, been substantial. I would like once again to emphasise the shares in Tin Mining companies continue to constitute the predominant proportion of the Corporation's total investments.

It follows from the above that it is to be anticipated that the dividends received by the Corporation in 1954 cannot be expected to equal those received in the preceding year. I believe, however that the long term prospects are good. We have high hopes of some of our new investments. So far as Tin is concerned, may I express the hope that every possible support will be given to the Tin Research Institute of the International Tin Research Council. With adequate backing the Institute may be able to make a vital contribution to the prosperity of the tin industry by discovering or devising new and better uses for tin in this metallic age.

LIST OF PRINCIPAL INVESTMENTS

Tin Mining Companies

Amalgamated Tin Mines of Nigeria Ltd.
Ayer Hitam Tin Dredging Ltd.
Kamunting Tin Dredging Ltd.
London Tin Corporation Ltd.
Malayan Tin Dredging Ltd.
Pengkalan Ltd.
Petaling Tin Ltd.
Rahman Hydraulic Tin Ltd.
Southern Kinta Consolidated Ltd.
Southern Malayan Tin Dredging Ltd.
Southern Tronoh Tin Dredging Ltd.
Sungei Besi Mines Ltd.
Sungei Way Dredging Ltd.
Tronoh Mines Ltd.

Miscellaneous Mining and Oil Companies

Aluminium Ltd.
Anglo-Iranian Oil Co. Ltd.
Anglo-Newfoundland Development Co. Ltd.
Associated Manganese Mines of South Africa Ltd.
British South Africa Co.
Consolidated Mining & Smelting Co. of Canada Ltd.
Consolidated Zinc Corporation Ltd.
Conwest Exploration Co. Ltd.
Hollinger Consolidated Gold Mines Ltd.
Hudson Bay Mining & Smelting Co. Ltd.
Imperial Oil Ltd.
International Nickel Co. of Canada Ltd.
Lake George Mining Corporation Ltd.
Messina (Transvaal) Development Co. Ltd.
Mining Corporation of Canada Ltd.
Mount Morgan Ltd.
Nchanga Consolidated Copper Mines Ltd.
Noranda Mines Ltd.
Rhodesia Broken Hill Development Co. Ltd.
Rhodesian Selection Trust Ltd.
Rhokana Corporation Ltd.
Roan Antelope Copper Mines Ltd.
San Francisco Mines of Mexico Ltd.
"Shell" Transport & Trading Co. Ltd.

ARISTON GOLD MINES (1929) LTD.

The twenty-fourth annual general meeting of Ariston Gold Mines (1929) Ltd., was held on March 1, 1954, in London.

Major General W. W. Richards, C.B., C.B.E., M.C., Chairman of the Company, presided.

The Chairman said: Production returns for the four months of the current financial year show a Revenue of £494,615 and a Working Profit of £162,609. We have just received a cable from the General Manager, Mr. Frank Clelland, reading as follows: "February output 32,500 tons; production approximately 10,900 ounces; working costs approximately £86,000. These figures not yet final." However, from these figures the February output is a record as regards both tonnage and gold recovered.

Regarding the new Winder, manufacturers' deliveries have delayed shipments of final Units, which, however, will be made in the course of the next few weeks, and so enable commencement of operation about August next, as mentioned in my Review.

Some little time must elapse before the full capacity of the Winder, namely 40,000 tons monthly, can be utilized. In the meantime, organization of the underground stoping position is in an advanced stage, and other important elements, such as power requirements, are in course of synchronization, and will ensure smooth take-up of the progressive increased production.

DIVIDEND

The rate of dividend of 30 per cent (9d. per unit) has been maintained for 1953. Earliest possible consideration will be given to the declaration of an Interim Dividend on account of the current year. It is the intention of the Board to stabilize dates of payment of future dividends.

DEVELOPMENT UNDERGROUND

No. 2 Orebody.—Included in the reserves is a block (No. 6 South) between the 19th and 22nd levels south of the Central Shaft of about 100,000 tons of ore of an average value of 6.0 dwts. over 109 inches. Development on the 16th and 18th levels is being carried out, and should reach the position of this block about September next. We have hopes that this work will disclose a substantial increase in the known tonnage in this section of the mine.

North Orebody.—Reef exposed in this orebody on the 20th level showed an average value of 10 dwts. over 126 inches for a distance of 662 feet.

On the 24th level the reef extends over 1,500 feet of an average value of 6.8 dwts. over 106 inches.

Work is proceeding to open up the orebody on the lower levels, and it is obvious that the reef so far disclosed lends every encouragement to exploration at depth.

EFFICIENCY AND LABOUR

Mr. Frank Clelland, General Manager, writes as follows:—"With an assured supply of waste for stope fill now available, increasing attention has been paid these last months to improving drilling and breaking efficiency in stopes. Much remains to be done with regard to the setting up of properly worked out bonus incentives coupled with labour control, but steady progress is being made. There are now good grounds for belief that the present labour force is, at least, adequate for our purposes. The labour position is quiet."

Mr. Clelland also reports that successful efforts have been made in controlling the general level of cost of living, thus contributing to the maintenance of goodwill and contentment amongst our African labour force.

Our relations with the African labour are on a co-operative basis, and we have been able to maintain this for many years.

CHAIRMAN'S STATEMENT

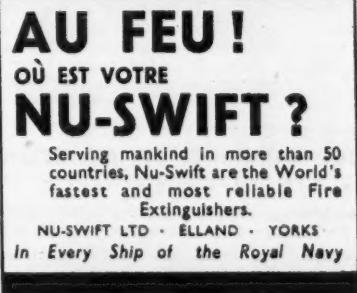
The following is an extract from the statement of the chairman circulated with the report and accounts for the year ended September 30, 1953:

The gross bullion revenue of £1,540,291 is a record. After taxation, the profit for the year is £145,901.

An interim dividend of 3d. per unit (10 per cent) has been paid, and the Board recommends a final dividend of 6d. per unit (20 per cent), making a total of 9d. per unit (30 per cent) for the year.

The ore reserves at 2,871,002 tons of an average value of 6.72 dwts. represents nearly eight years' supply at the current rate of milling.

The report and accounts were adopted.



BURMA MINES LIMITED

The following summarizes a report of the operating results of Burma Corporation (1951) Limited (Incorporated in the Union of Burma) for the three months ended December 31, 1953, together with progressive details of Ore Extraction, Production and Estimated Revenue and Expenditure for the six months ended December 31, 1953.

ORE EXTRACTION

Quarter ended September 30, 1953	...	...	...	17,800 tons
Quarter ended December 31, 1953	...	...	...	18,435 tons
Total for six months ended December 31, 1953	...	...	...	36,235 tons

PRODUCTION

Quarter ended	Concentrating Ore Milled (tons)	Assays		
		Oz. Silver	% Lead	% Zinc
September 30, 1953	19,406	13.04	15.843	12.577
December 31, 1953	18,550	12.501	15.286	9.231

Marketable Products were as follows:

Refined Lead	Refined and Doré Silver Oz.	Copper Matte Tons	Zinc Concentrates 57% - 58% Zn. Tons	
			Tons	Tons
September 30, 1953	2,188	124,914	59	2,799
December 31, 1953	1,785	170,343	18	1,817
Totals for six months ended December 31, 1953		295,257	77	4,616

ESTIMATED REVENUE AND EXPENDITURE

	For the Quarter ended		For the six months ended Dec. 31, 1953	
	Sept. 30, 1953	Dec. 31, 1953		
Estimated Gross Revenue (including value of Metal Stocks)	K.44,05,800	£330,435	K.37,30,300	£279,772
Estimated Operating Expenditure	K.37,44,700	£280,853	K.30,54,500	£229,087
Estimated Excess of Revenue over Expenditure	K.6,61,100	£49,582	K.6,75,800	£50,685
Estimated Taxation	Nil	Nil	Nil	Nil
Estimated Depreciation on Machinery and Plant	K.1,09,400	£8,205	K.1,26,500	£9,487
Capital Expenditure	K.1,24,500	£9,338	K.2,84,100	£21,307
			K.13,36,900	£100,267
			Nil	Nil

The Sterling figures shown are based on a Rate of Exchange of 1s. 6d. per Kyat.

GENERAL

Mine Ore Extraction at 18,435 tons increased by 3.57 per cent over the previous quarter.

The number of underground workers increased from 1,280 at June 30, 1953, to 1,381 at September 30, and to 1,416 at December 31, 1953.

Reconditioning of No. 4 Generator (4,000 kW.) at Mansam Falls Generating Station is now complete and this machine is about to be put into commission.

Detailed plans for the provision of additional Milling capacity are now being drawn up in collaboration with a firm of Consulting Engineers, whose representative has been at Namtu for some time studying the project.

37 Dover Street, London, W.1.

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, GEOLOGIST OR SENIOR GEOLOGIST. The Civil Service Commissioners invite applications for a pensionable appointment at the Geological Survey and Museum, South Kensington, for work connected with geophysical surveys in the field.

Candidates must have a first or second class honours degree in Geology, or Geophysics, or Physics or Mathematics with at least first year standard both in Geology and in Physics or Mathematics or equivalent qualification. Experience in Applied Geophysics an advantage. For appointment as Senior Geologist candidates must have at least three years post-graduate or other approved experience.

For Senior Geologist candidates must be at least 26 on April 1, 1954. For Geologists at least 21 and under 30 (under 31 for established members of the Experimental Officer class) on April 1, 1954, with extension for regular Forces Service. Inclusive annual remuneration for a 45½-hour week: Men, £475-£877 or £990-£1,161; Women, £475-£764 or £849-£1,025, according to grading. Provision for starting salary above minimum. Promotion prospects.

Further particulars and application forms from the Civil Service Commission, Scientific Branch, 30 Old Burlington Street, London, W.1, quoting No. S4294/54. Application forms to be returned by April 15, 1954.

JUNIOR METALLURGIST required by British company operating Silver/Copper Mines in Peru. Salary according to experience and qualifications. Three year contract. Knowledge of Spanish an advantage. Box J 299, Lee and Nightingale, Liverpool.

MINING ENGINEER WANTED
Qualified and experienced Mining Engineer required for columbite (alluvial and eluvial), prospecting and mining in P.E.A. (Mozambique). Married accommodation available in full furnished house; healthy climate; 1st class passages, including family. Write, giving age, marital status, details of qualifications and experience and other conditions of employment to: Empresa Mineira Do Alto Ligonha (Sarl), P.O. Box 1152, Lourenco Marques (P.E.A.). All applications treated as confidential.

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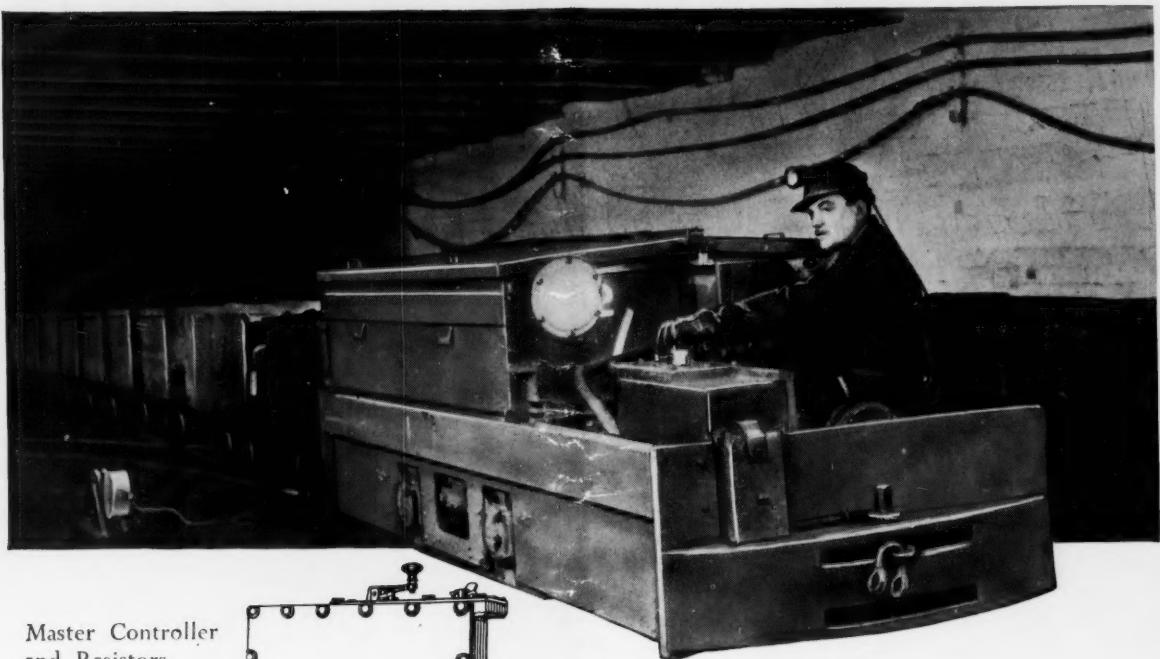
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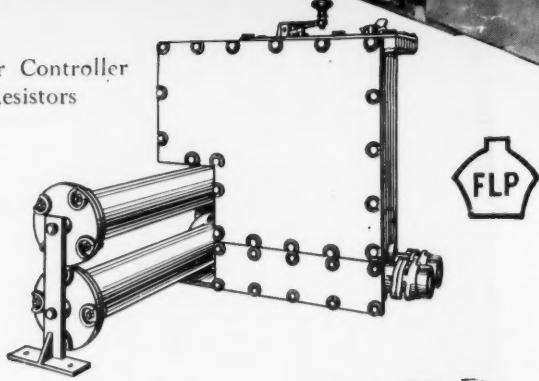
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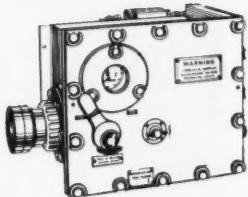
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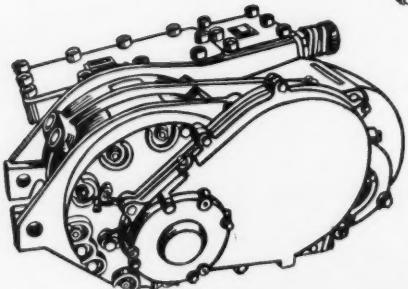
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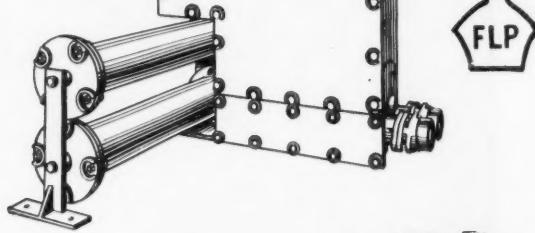
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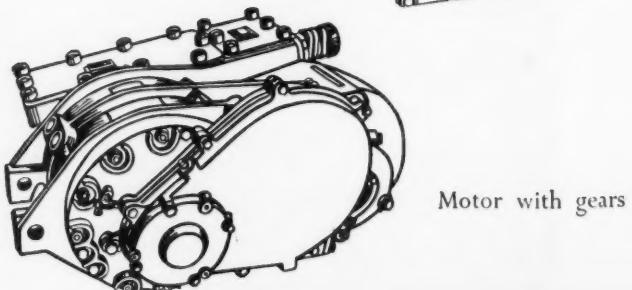
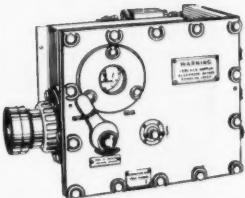
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